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User's Guide for MicroDEM 5.1

November 2001

Microdem is written by the US Naval Academy, and distributed jointly by the Naval Academy and the US Army Engineer School at the Maneuver Support Center, Fort Leonard Wood. The program has now surpassed over 50,000 downloads per year. This user's guide was written by the Terrain Visualization Center, the primary tester and user support contact for military users of the program.

Chapter 1 Welcome to MicroDEM

Introduction

Where possible this tutorial has been written as a generic 'How-To' without reference to the specific data files being used. Many of the procedures will utilize the HangRockCanyon_DEM_2.tar.gz elevation data and Hangrock.IDX imagery data distributed with your software. These files will be located on your hard drive under the ..\Mapdata\DEMS directory and ..\Mapdata\SATS directory, respectively. Hanging Rock Canyon is located in California, near Death Valley.

Some steps will require that you use other data files. In all cases, you should be able to substitute your own data for the data files mentioned in the tutorial. Simply be sure to substitute an elevation file for an elevation file, a map file for a map file and an image file for an image file. Examples of how to work with a specific data format will of course require data files of that type.

Remember that your elevation, image and map files must have overlapping coverage and that you should always load your elevation file first. Check out the Links to Download Free Data at the TVC website:
http://www.wood.army.mil/TVC/DefaultPageContents/download_digital_data_for_free.htm.

Common File Types by Extension

The following are a few of the common file extensions and data types used in MicroDEM:
ADRG: NIMA Arc Digitized Raster Graphics scanned paper maps.
AFT: Area Feature Table for NIMA VPF data.
AVI: Microsoft Audio Video Interleave video format.
BMP: Windows bitmapped imagery.
BPW: World file for image registration for BMP files.
CADRG/CDRG: NIMA Compressed Arc Digitized Raster Graphics scanned paper maps.
CAT: Catalog file list complete coverage for NIMA VPF data.
CIB: NIMA Controlled Image Base, gray-scale imagery available in 10meter and 5meter resolution.

DEM: U.S. Geological Survey (USGS) Digital Elevation Model available in 90 meter, 30 meter and 10 meter postings. In the new MICRODEM DEM format, each DEM has a single file. In the old MICRODEM format, which is still supported, each DEM has two files, the .DEM data file and a .HDR header file.

DBF: Industry standard database table used for vector data attribution.

DIN: ASCII Index file for DEMs in a directory or series of directories.

DIX: binary index file for the DTED or GTOPO30 elevation files.

DT0: National Imagery and Mapping Agency (NIMA) Digital Terrain Elevation Data available in Level 0, 30 arc-second ~900 meter postings.

DT1: National Imagery and Mapping Agency (NIMA) Digital Terrain Elevation Data available in Level 1, 3 arc-second ~90 meter and Level 2, 1 arc-second ~30 meter postings.

DT2: National Imagery and Mapping Agency (NIMA) Digital Terrain Elevation Data available in Level 2, 1 arc-second ~30 meter postings. NIMA uses DT1 for both DTED Levels 1 and 2, but MICRODEM uses DT2 when it copies DTED level 2 to the hard disk.

DLG: USGS Digital Line Graphics vector map data.

DRG: USGS Digitized Raster Graphics scanned paper maps.

DXF: AutoCAD digital exchange files.

FLT: ASCII file with the flight path for movies.

F41/F42: Associated with US Census Bureau 1990 and 1997 TIGER vector data.

GIS: ERDAS Imagine 7.X image format

GPS: Binary file for tracks recorded with a GPS.

HDR: Old binary header file for the original MICRODEM format. The program can still read these files, but cannot write them.

ICN: ASCII file listing the locations and file names of map icons to overlay on the map.

IDX: ASCII index file for a single satellite image. This is the native TerraBase II and MicroDEM image format.

IIN: ASCII index file for the image scenes in a directory or series of directories.

IMG: A commercial geographic information system (GIS) imagery format utilized by ERDAS Imagine and the Digital Topographic Support System (DTSS) used by Army Topographic Support Terrain Teams.

LAN: ERDAS Imagine 7.X grid and image data format.

LFT: Line Feature Table for NIMA VPF data.

LL: Lat/long positions files. ASCII values.

MIC: Military icons file

MOV: Movie file, an ASCII listing of the BMP or JPEG files used to create the movie. This is not the Quicktime MOV format.

MPG: Industry standard MPEG compressed video format.

MSC: Project file used to restore analysis.

NET: Structural geology data.

NITF: National Imagery Transfer Format.

PFT: Point Feature Table for NIMA VPF data.

PLR: Pipeline route file, ASCII with the locations of the turning points of the route.

RT1/RT2: Associated with US Census Bureau 1990 and 1997 TIGER vector data.

SHP: ESRI industry standard vector data shape file.

SIN: Vector map SIN files, single precision reals with coordinates.

TDW: ASCII datum file to go with the TFW world file. Contains the datum, UTM zone, and hemisphere.

TFW: Geotif World Files are often associated with some tiff files and carry the geo-location information required for using the imagery in a GIS system.

TGT: Target location. Used with a target approach movie to toggle on and off the location of the target in the center of the screen. This is an ASCII file stored in the \MapData\Movies directory.
TIF: Industry standard geo-referenced GEOTIF files with/without .twf world file.
TOC: Commonly associated with the area table of contents A.TOC file for NIMA Controlled Image Base (CIB) and Compressed Arc Digitized Raster Graphics (CADRG) data.
XY: imagery registration file

Additional Training Materials

Video Battle Drills are available for download from **http://www.wood.army.mil/TVC/MicroDEMV5/microdem_ver_51.htm.** These movies show new functions available in the MicroDEM 5.1 Series or changes to procedures available in earlier versions.

Installation

You may download the full installation program from the Fort Leonard Wood web site at http://www.wood.army.mil/TVC/MicroDEMV5/microdem_ver_51.htm.

Installing MicroDEM is accomplished by simply running the installation program and following the instructions. You'll be asked to provide the drive ID and path for installation if you don't wish to use the default C:\Program Files\MicroDEM-TBII and C:\Mapdata directories. The Mapdata directory is used for data output and file conversion and should therefore be placed on a drive or partition with a large amount of free space. The MAPDATA directory must also be at the root level of its drive, and you must have write permission if you place it on a network drive.

Upgrading

If you have installed a previous version of TerraBase II or MicroDEM you will need to download the new installation file for MicroDEM 5.1. Subsequent upgrades will be released as full installations and as replacement executables. Once you have installed an earlier version in the MicroDEM 5.1 series you may upgrade to the latest version by downloading the replacement executable from the Fort Leonard Wood site. This .exe file should be placed in your MicroDEM directory. Since the file name will be different from the original MicroDEM.exe you'll need to create a new shortcut from your desktop to the new executable.

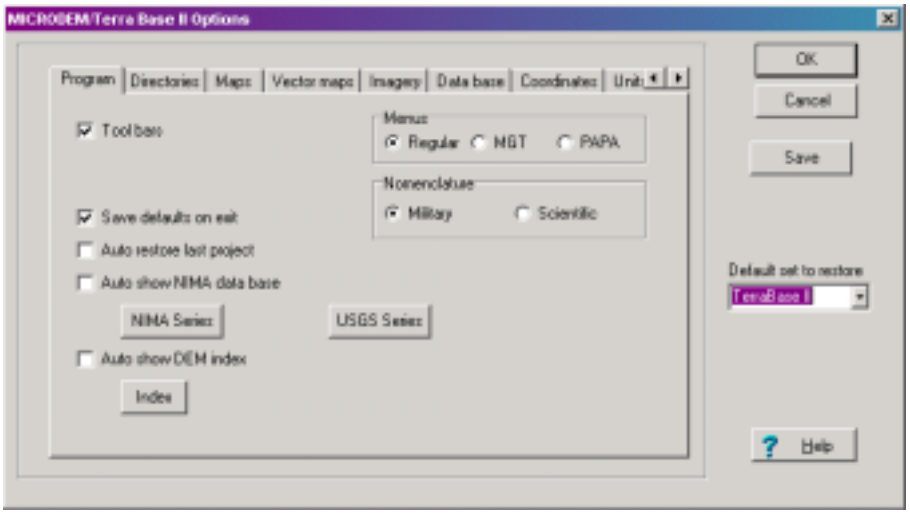
To create a new desktop icon right-mouse click on your desktop and select NEW and SHORTCUT. In the Create Shortcut window click on the <BROWSE> button and navigate to your MicroDEM directory, select the file name of the new .exe file and click on <OPEN> <NEXT> and <FINISH>. The new MicroDEM icon will now appear on your desktop → 

Program Navigation

In this tutorial, words in < brackets> refer to toolbar buttons. Main menu, drop down menu and pop-up menu commands such as FILE / OPEN DEM are in all caps. Titles for checkboxes and other options are underlined. Descriptive titles are shown in 'semi-quotes'. All mouse clicks are left mouse clicks unless otherwise stated.

Setting Options

Before you start using MicroDEM you must set your software defaults. This will insure that you are using the same menus, settings and datums as other users. Army personnel and users of this tutorial should set their software defaults to TerraBase II by selecting OPTIONS/DEFAULT SET TO RESTORE/TERRABASE II then hit the <OK> button and exit the program. Exiting the program and restarting will insure that these configuration changes are saved even if you later encounter a bug or error in processing. Using the save button will also immediately save your current settings.



You may fine tune any of the settings available under OPTIONS but be careful; many of the settings will affect the size and /or resolution of your resulting products. Some options such as your PRIMARY DATUM, will critically affect the accuracy of your coordinates. Be certain your Global Position System (GPS) receiver, all maps products and your software are all set to the same datum. You should be using WGS84 unless you have specific and compelling reasons to pick another datum.

Starting the Program

a. Double-click the desktop icon → 

b. If you do not have a desktop icon, select START/ PROGRAMS/MicroDEM-51. The actual group-name will depend on the directory name you chose while installing MicroDEM.

c. If you want to create a desktop icon simply right click on your desktop and select NEW / SHORTCUT. This will bring up the Create Shortcut pop-up window. Click on the <BROWSE> button and navigate to the location of the MicroDEM.EXE file under the directory where you installed MicroDEM.

MicroDEM HELP

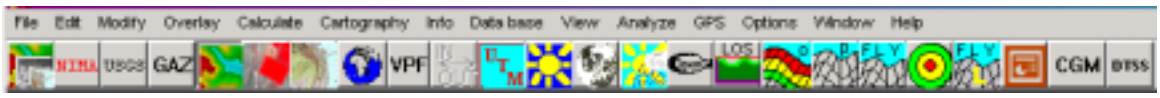
Information on the operation of MicroDEM and many related subjects such as remote sensing, geology, micro-paleontology, hydrology, et cetera may be accessed through the built in HELP function by clicking HELP at the main menu.

Main Menu and GUI Buttons

MicroDEM 5.1 is designed like most current Windows programs with a Main Menu and pull-down sub menus such as FILE / OPEN DEM.

Note: The layout of your main menu will vary depending upon the OPTIONS you've selected, the type of data you are displaying and which child-display you currently have highlighted. Your menu will change while you are working with MicroDEM, but don't let this confuse you. Some functions are available for maps, other functions are only available for imagery and some will only be available if you have both your elevation data and image/map data loaded.

Many of the common menu functions will also be available from the graphic user interface (GUI) buttons located beneath the Main Menu. For simplicity, we will use the toolbar for most of the MicroDEM applications in this tutorial.



If you allow your pointer to rest on an button while moving your mouse across the GUI buttons you will get a small button title or 'hint' describing the function of that button. Note: As you open files, more buttons will appear and/or activate otherwise they may be grayed-out and inactive. You can also turn off some of the more "exotic" program functions using the last tab on the defaults form invoked with the options menu choice. If you cannot find a function that you know should be available, check what might be disabled on this form.

Child Display GUI Buttons and Options

Individual elevation, image and map displays will each have their own GUI button menu bar. You can right click your mouse on many of the displays to get additional options. These options are also available in the Main Menu. You may find you prefer to right click on your display to access some functions, especially if your image or map is too small to allow access to all your child display's GUI buttons.

Note: Not all display toolbar button functions will be available at all times for all data types. Some buttons may be grayed-out or may be missing depending on the type of data you are displaying and the type of display window you are using.

Display Slider Bars

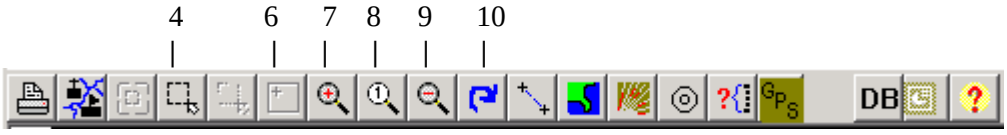
Most windows will have slide bars, indicating the image is actually larger than the current display. You can use these slide bars to display the unseen parts of your image. If you have enlarged your display to larger than the original MicroDEM window and then move the secondary display you can wind up with a double set of slide bars, as seen below, which may at first be confusing. One set is for the individual map display window, and the other is for the entire desktop.

Resizing Your Display

You can resize a window, to avoid using multiple slide bars, by right clicking on either edge or the tab at the bottom right corner and dragging while holding down your mouse button. This is allows you to adjust the size of your window so you can see the marginal data and/or all your GUI buttons for each display.

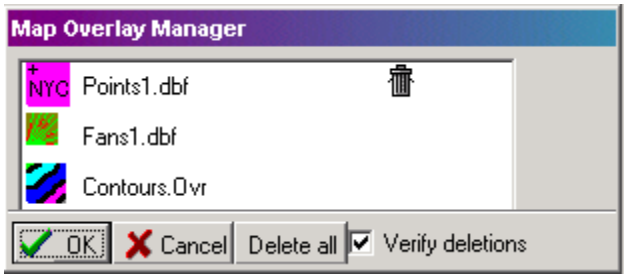
Zooming In/Out and Window Subsets

MicroDEM offers a <Subset> button 4 <Center Map> button 6, <Zoom–In> button 7, <Zoom 1:1> button 8 where one screen pixel equals one ground pixel, <Zoom-Out> button 9, a limited Undo feature <Force Redraw> button 10 and other options to customize your display of windows and files. See the **Basic Operations** section for more information on modifying the screen.



The Overlay Manager

Individual raster overlays, which you have created, may be manually sorted or deleted using the OVERLAY/OVERLAY MANAGER. The order of overlays in the Overlay Manager reflect the drawing order on your display. If one of your overlays is obscuring another simply click on that overlay and drag it to a new position in the stack. To delete a single overlay simply click on it and drag it to the trash can at the upper right corner of the manager window.



NOTE: If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

General Program Tips

The status bar on the bottom of the screen will display useful information. This includes:

- The action the program is expecting of you is displayed in the left-most panel.
- The current coordinates and elevation in the second panel.

Chapter 2 Basic Raster Operations

Open an Elevation Data File
Altering the Grid Overlay
Changing Coordinate and Elevation Readout Displays
Changing Primary and Secondary Datums
Modifying the Display
Modifying Display Parameters of Elevation Data
Open Imagery
Open Digital Maps (ADRG, CADRG, or DRG)
Editing the Display
Placement of Marginalia
Printing, Print to Scale and Print Preview
PowerPoint and MicroDEM
Data Manipulation
Loading and Displaying Data Using the NIMA Database

Open an Elevation Data File

DTED or Digital Terrain Elevation Data is a National Imagery and Mapping Agency (NIMA) product ordered through your supply system and the Defense Logistics Agency. DTED Level 1 files are available for a large part of the world and have elevation postings of three arc seconds or approximately 90 meters. DTED Level 2 files are available for more limited areas and have elevation postings of 1 arc second or approximately 30 meters.

To find out how to order NIMA data check out the following URL: **http://www.wood.army.mil/TVC/DefaultPageContents/ordering_nima_data_through_dla.htm.**

DEM or Digital Elevation Model is a US Geological Survey product ordered through USGS. Check out the USGS web site **http://www.usgs.gov/**. DEM files are available in 3 arc seconds (about 90 meter), 2 arc seconds (about 60 m), 1 arc second (about 30 m), 30 meter and 10 meter elevation postings for the United States. To locate free samples of USGS and other data check out: http://www.wood.army.mil/TVC/DefaultPageContents/download_digital_data_for_free.htm.

Note: To open a NIMA DTED elevation file, you will need to know the latitude and longitude of the desired location. You can find them on the corners of a map or in the NIMA hardcopy or digital catalogs. If you have MGRS or UTM coordinates and need to convert them to Lat/Long coordinates see the section on Coordinate Conversion in Chapter 3. NIMA DTED files are located in directories named by longitude and subdirectories named by latitude. The file coverage is based on one-degree cells, approximately 60 nautical miles or 111 kilometers on a side. Each file of DTED Level 1 is approximately 2.9Mb in size and is found by the longitude then latitude of the SW corner.

USGS DEM elevation files usually have quadrangle-map names and you'll need a catalog, overview display or other listing to figure out which file you need.

You can also use the local database functions to organize your data files, and allow graphical selection using a map.

As an introduction to using elevation data we'll simplify the procedure by simply opening the Hanging Rock Canyon elevation file distributed with MicroDEM.

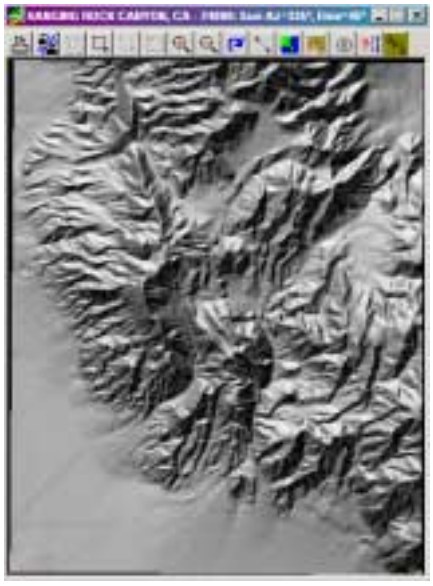
Select the <Open DEM> button → 

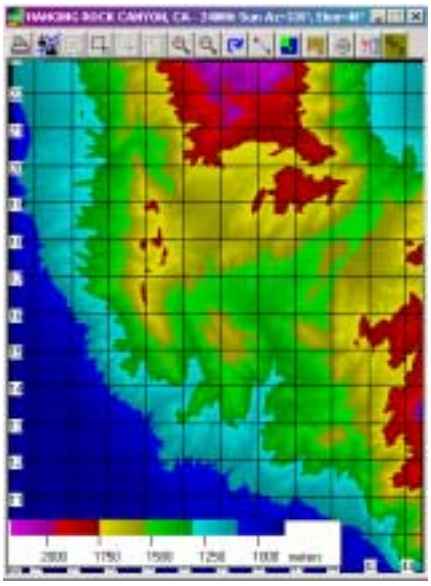
In the Open New DEM window navigate to the drive where you placed your Mapdata directory ..\Mapdata\DEMS. You may need to insure that they Files of Type box at the bottom says any likely dem or all files to find a .dem file. Open the file **HangRockCanyon_DEM__2.tar.gz**.

Note: The .tar.gz file is a compressed file format commonly used for distribution on the Internet. MicroDEM automatically decompresses such files for your use. Older USGS DEM elevation files often have a .DEM extension (newer ones consist of about 18 files with DDF extensions) and normal NIMA DTED files have a .DT1 extension.

Unless you've changed the default setting under OPTIONS/MAPS/DEFAULT DISPLAY a grayscale reflectance map will be drawn.

TIP: You will probably need to resize the window in order to see the marginal data displayed on bottom. To do this, use your mouse to grab the bottom edge of the Elevation Map window and pull it down. Take a minute to orient your self to the display.



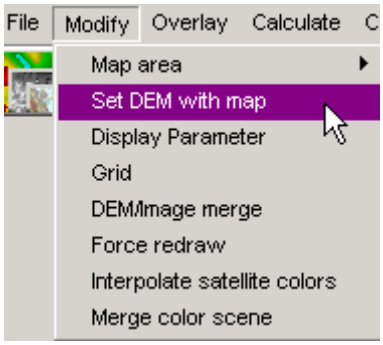


A shaded relief or reflectance map, as shown on the left, is generated with shadows to simulate an aerial image. See Chapter 2 Modifying Display Parameters of Elevation Data. Instead of the reflectance map, on the Maps tab of the options form you can select an elevation map for the default display.

The six-color display, as shown on the right, is created by distributing the six main colors in the legend at the bottom from the highest to lowest elevation within the DEM. Each elevation file will have its own color shading. **Very important** - blue does **NOT** necessarily represent water but rather the lowest elevation range. In the margin of your display you should see a grid-coordinate and legend as shown above.

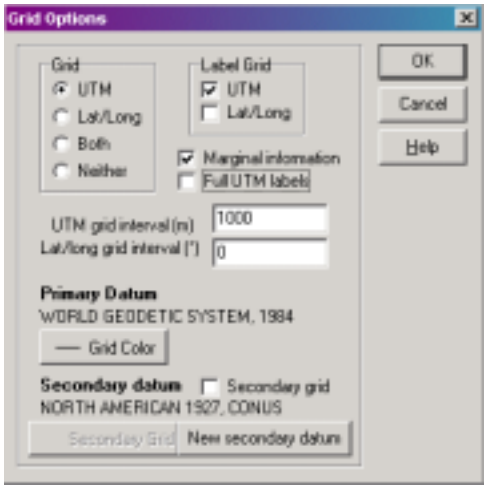
LOOK at the bottom of your main MicroDEM window and you'll see the current coordinate position of your mouse pointer, elevation reading (Z value) and horizontal datum. The default coordinate is in MGRS, elevation is in meters and datum is in WGS-84, but you can change each of these factors in the OPTIONS Menu.

NOTE: Previous versions of TerraBase II and MicroDEM required that you first open your elevation data BEFORE you opened your image or map data. This would automatically associate the image or map with the elevation data so that you could perform analysis and create 3D products. Now you can load the elevation data after the image or map and associate the two by clicking on your image or map to highlight its title bar then selecting MODIFY / SET DEM WITH MAP.



Altering the Grid Overlay

Your display will initially appear with only the primary grid overlay. If you are displaying a military map it will have its own grid so you will not need to overlay another grid unless the original map is on a different datum. You can display both your primary and secondary datum grids and latitude/longitude tics or you may elect to turn off your grid overlay for certain cases such as when viewing scanned military maps which will have their own grid. The primary datum is black (by default) in color and will match the default datum listed in the margin of the window. In this case, the primary datum and grid display will be in WGS-84. The secondary datum, in this case North American Datum 1927, will appear by default as a red grid. You may alter the grid overlay by right clicking on your display and selecting GRID to bring up the Grid Options window. Click on the <Grid Color> and <Secondary Grid> buttons to change the colors of your primary and secondary grids.



Using the Grid Options window you may elect to remove the marginal area around your data display. The margin holds the UTM and Lat/Long coordinate text and the Legend information specific to your display. Once you've selected the changes to your grid overlay click on the <OK> button to redraw your display.

Changing Coordinate and Elevation Readout Displays

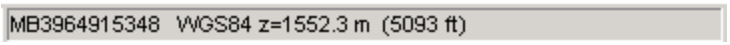
To change the Coordinate Readout Display:

Select **OPTIONS/UNITS**. You can display the coordinates of the current position of your mouse pointer in Military Grid Reference System (MGRS), Short MGRS as shown above, Universal Transverse Mercator (UTM) or in Latitude/Longitude. Under Locations select the radio button next to the desired display type Latitude and Longitude then under Lat/Long select the radio button for Decimal Seconds then click <OK> button to close the MicroDEM/TBII Option window.

The coordinate readout will change as soon as you return to the map.

To change the Elevation Reading display:

Select **OPTIONS/COORDINATES** and check the Dual Elevations to display your z values in both meters and feet then click the <OK> button. The elevation display changes as soon as you return to the map.



Changing Primary and Secondary Datums

Regional horizontal datums, such as North American Datum 1927, reference all locations from a point on the surface of the ellipsoid and are accurate only for that region. Global horizontal datums such as WGS-84 are earth centered and accurate for locations world-wide.

Select **OPTIONS/MAPS** then click on the <PRIMARY DATUM> button to open the Default Local Datums window. In this window you may select from a large number of world-wide horizontal datums. MicroDEM defaults to WGS-84, the DoD standard. To change primary datums search through and highlight the desired datum. Select NAS-C, North American Datum 1927, CONUS then click on the <OK> button.

NOTE: If you have any displays open, they will remain in their existing datum, but all new files (DEM, satellite, and map) will open in the new datum.

To prove this point open a second HangRockCanyon_DEM_2.tar.gz file by selecting the <OPEN DEM> button. Note that your initial DEM display is in WGS-84 and your new DEM display is in NAS-C datum instead of WGS-84. This datum change shifted the grid lines approximately 200m to the north.

The secondary grid may be changed by selecting OPTIONS/MAPS/ and clicking on the <SECONDARY DATUM> button to open the Default Local Datum selection window. Again highlight the desired datum and close by clicking on the <OK> button.

NOTE: Before continuing it is recommended that you switch your datums back by repeating the previous steps, selecting WGS-84 as your Primary Datum and NAS-C as your Secondary Datum.

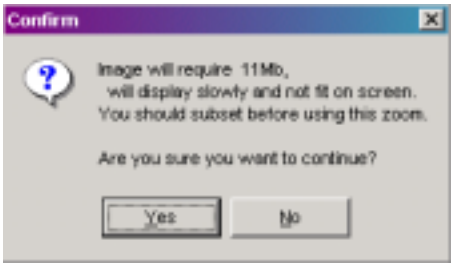
The whole purpose in having multiple grid overlays on your display is to provide a method of correctly referencing coordinates on your display when working with other equipment or maps which are utilizing other horizontal datums. Ideally you should have all your equipment and maps on a common datum such as WGS-84.

Modifying the Display

Remember almost anything displayed on the screen can be modified by using the tool bar, the command line, and/or right clicking the display itself.

Zooming In. Select the <Zoom-In> Icon → 

NOTE: As you zoom in MicroDEM extracts more data from the data file taking up more of your computer's RAM. It will warn you if the RAM requirement begins to increase. Every computer will behave differently depending on the available amount of RAM and virtual drive space. Each type of data behaves differently depending on resolution and color depth. As you gain experience you should make note of how much you can zoom-in on your computer for each type of data. If you push the limits too hard the software will crash and you'll have to start over.



If you need to really zoom in on one area, it is wiser to first subset the area, then zoom in to use less memory (covered in the next section under Window Sub-setting).

Zooming Out. Select the <Zoom-Out> Icon → 

Zooming out is straight-forward and represents no limitations other than the fact that your display window may become too small to properly display all your GUI buttons. Don't worry; all of the GUI button functionality is available by right clicking on your display or from the MAIN Menu.

Window Sub-setting.

Often your initial display will cover too large an area for practical use. To view your specific area of interest (AOI) without zooming-in and worrying about RAM limitations simply perform a window subset.

Select the <Subset & Zoom> icon → 

To select the area to subset left mouse click and hold your mouse button on the upper left hand corner then drag the box border down to your lower right hand corner and release. A new window will appear with the smaller area.

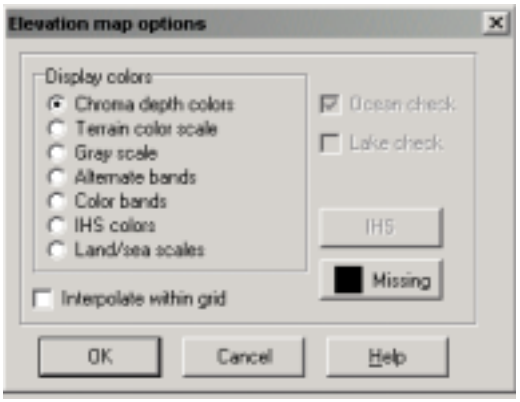
To restore your original display select the <FULL DATA SET> button → 

NOTE: You can also permanently subset areas for repeated use. This procedure will be covered later in Section 9, "Data Manipulation".

Modifying Display Parameters of Elevation Data

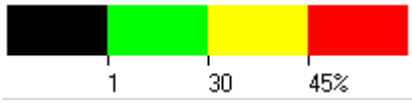
Elevation data may be displayed in several different ways. By default your elevation data will be displayed as grayscale reflectance map unless you've changed the default setting under OPTIONS/MAPS/DEFAULT DISPLAY. To bring up your Display Parameter menu simply right mouse click on your elevation data display and select Display Parameter from the initial menu.

Elevation: The current window shows the six-color 'Elevation-Tint' color scheme also known as the 'Default Rainbow Colors'. These colors are selected to give the best 3D shift when wearing ChromaDepth™ 3D glasses. To change the color scheme of the elevation display tint, right click on the window and select one of the display colors from the menu. Here you may select from seven different color schemes.



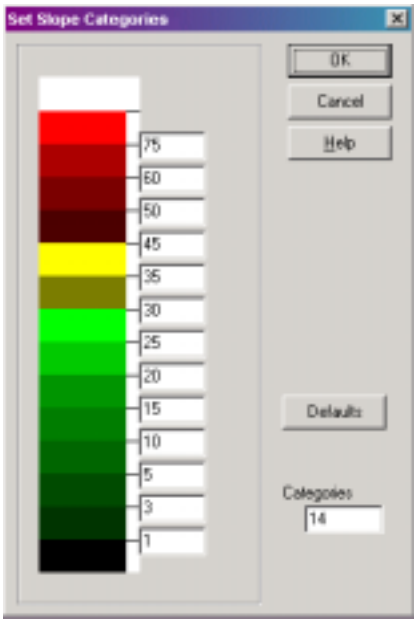
NOTE: The Interpolate within grid checkbox is used to smooth-out the pixels after you've zoom-in or performed a window-subset.

Slope/Cant: Mobility analysis plots are called slope plots. Artillery analysis plots are referred to as cant plots. This function produces a display which represents the four slope categories, <1%, 1-30%, 30-45% and >45% of the NATO mobility model. This is often called a Trafficability plot and is used in assessing cross-country mobility. The legend for the category colors can be found at the bottom of the window.



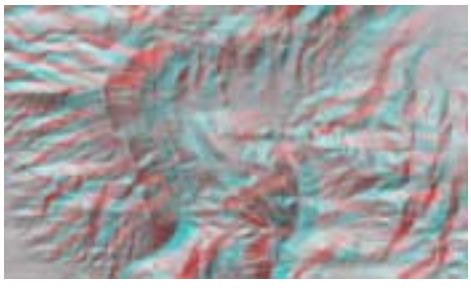
Right click on the display and select Standard from the five available slope plot options on the pop-up menu. This will allow you to customize your slope plot by setting slope ranges and colors for fourteen different categories.

The Set Slope Categories pop-up window will allow you to edit the number of categories, the range for each category and the associated color. Accept the given display for now and click the <OK> button. The display is now broken down into more categories and the new legend can be found at the bottom of the window. See the Slope Maps section in Chapter 4.

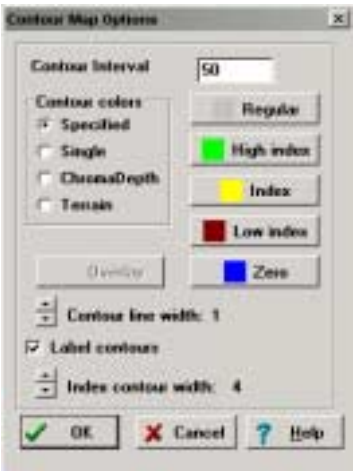


Reflectance: A new window appears allowing you to select the sun azimuth and elevation. Click the <OK> button. The display will now turn to a gray shaded, pseudo satellite view with shadows created by the sun's position. To modify for example right-click on the window and change the sun's azimuth to 25 degrees (instead of 335). Changing your lighting parameters can help you bring out subtle terrain features that might otherwise remain unnoticed.

Stereo Anaglyph: Right click on your display and select Stereo anaglyph. Your elevation display will be gray-scaled with a red-blue shift which when viewed with red-blue filter glasses will allow you to view the data in 3D. Right click again and select Anaglyph vert exag to change the vertical exaggeration of your view. See chapter 5 for more information on stereo anaglyphs.



Contour: Selecting Contour will bring up the Contour Map Options window. Here you to select the contour line interval (in meters) and the colors of the contour lines. Accept the given values and click on the <OK> button. The display changes to a white background with contour lines in multiple colors. This view provides a topo-line map like appearance. Another option covered under OVERLAYS later in this tutorial will allow you to place contours over any display background such as imagery.



DEM Color Merge: Selecting DEM color merge from the Display Parameter menu will create an elevation display with a reflectance background and an IHS transparent foreground elevation tint.

Blank: This creates a white/blank map display. You may place a grid and any overlay such as weapons fans, contour lines, point elevations you choose over the background. As you move the cursor across the white screen, you still get the coordinates and elevation in the margin. This display is very useful for printing scaled map board products on clear acetate.

Stereo Anaglyph merge: Selecting this function will create a product similar to the Stereo Anaglyph except that the map display will NOT first be gray-scaled. This will allow you to create stereo 3D views of imagery, maps and other products. **NOTE:** This function is entirely unsuitable for Elevation Tint, Slope/Cant and other displays with intense colors, which will simply be smeared instead of color-shifted.

DEM elev merge: This function will create a variation of the elevation tinted reflectance plot.

DEM slope merge: This function will create a variation of a reflectance background plot with a transparent color slope overlay.

DEM reflectance merge: This function will create a shaded relief overlay for your map. See 2D Shaded Relief Maps on page 132.

Open Imagery

MicroDEM can work with many types of satellite and aerial imagery files available from NIMA, USGS, your Terrain Team's Digital Topographic Support System (DTSS) and other commercial sources. This section covers how to open four basic types of imagery.

NOTE: You may display an image/map by itself for simple viewing; however, it is best to first open an elevation file covering the same area before you open your imagery/map files. Opening your elevation file and image/map together will allow you to perform many types analysis and create many 3D views.

First we'll go through an example of how to open an elevation file and image file for the same area then we'll look at how to work with the four basic types of imagery.

Open Controlled Image Base (CIB).
Open Digital Orthophoto Quads (DOQ).
Open ERDAS Imagine/DTSS Imagery.
Open Geotiff Imagery.

NOTE: Please pay careful attention to the Files of Type box at the bottom of the Open Satellite Image window to insure you are looking for the right kind of file!

First, if not already open, open the HangrockCanyon_DEM_2tar.gz file by clicking on the

<Open DEM> icon on your main menu → 

Next select the <Open IMAGE> button → 

In the Open Satellite Image window navigate to the location of the ..\Mapdata\ SAT directory and highlight the Hangrock.idx file. You may need to insure that the Files of Type box at the bottom says Image index file or All files. Click on the <OPEN> button to display the image.

Hangrock.idx is in the MicroDEM native format. If you permanently subset parts of satellite images that are in other formats, the resulting image will be saved in the MicroDEM .idx format. Permanent sub-setting is covered in the section on Data Manipulation.

Open CIB Imagery Files

Controlled Image Base (CIB) data is produced by NIMA and may be ordered through the Defense Logistics Agency (DLA) and your local supply system.

Click on the <Open IMAGE> button → 

This opens the Open Satellite Image window. Here you will navigate to the file location, normally a CD drive, of the RPF folder and double click on the A.TOC file. If you have your elevation data displayed, the footprint of the available CIB tiles will be displayed over your elevation data. If you do not have your elevation data already displayed , the foot print of the available CIB tiles will be displayed in the world vector .sin map
Double click on the northwest corner of the area you wish to display, hold down the mouse button and drag to the southeast corner before releasing. The selected tiles will be displayed as a seamless mosaic.

A second method of opening CIB allows you to open any one of the individual tiles. Be aware that the file naming convention for CIB tiles does not allow you to determine the location of a tile

by its name alone. Set the Files of Type in your Open Satellite Image window to Single CIB frame or All files. Search in for the sub folders under the RPF directory and select the desired file. Remember that this is not the recommended method for displaying CIB imagery.

Open DOQ Files

Digital Orthographic Photo Quadrangles (DOQ or DOQQ) are produced by the USGS and are available for the United States. DOQs are sold through various venders and may ordered through USGS web site **http://www.usgs.gov/**. To locate free samples of USGS data check out: http://www.wood.army.mil/TVC/DefaultPageContents/download_digital_data_for_free.htm.

DOQs are aerial photography taken by the USGS and are roughly 3.75 minutes /3.75 nautical miles square in coverage and are approximately one meter resolution. You will need to use an USGS Map Index or know the name of the DOQ file you desire to open.

Click on the <Open IMAGE> button → 

In the Open Satellite Image window navigate to the location of your DOQ file. Older DOQs are available in the band interleaved .bil file format. Newer DOQs are available in geotiff .tif format. Make sure that they Files of Type field at the bottom of the Open Satellite Image window is set to either USGS DOQ (uncompressed), GEOTIFF or All files. Highlight the desire file and click on the <OPEN> button to display the file.

NOTE: Merging multiple DOQ images into one large seamless image is covered in the section on Data Manipulation.

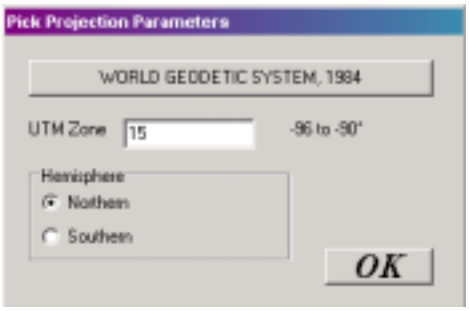
Open ERDAS Imagine/ DTSS Imagery

See your supporting Terrain Team/Topo Company to get imagery in the .img format.

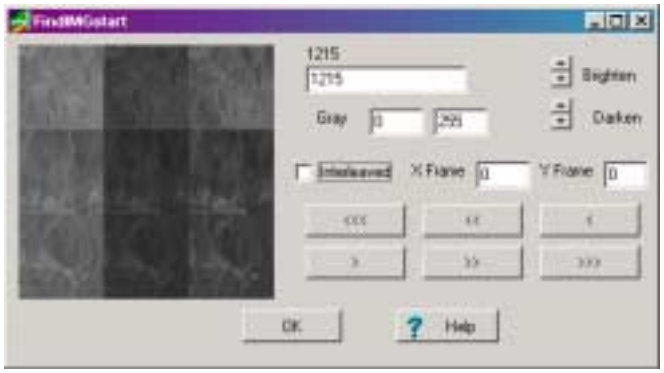
ERDAS .img files are loaded in a similar manner as other imagery files in the MicroDEM and may be either single band/grayscale/monochromatic or multi-band/color/multispectral.

Click on the <Open IMAGE> button → 

In the Open Satellite Image window navigate to the location of the desired .IMG file. Make sure that the Files of Type field at the bottom of the window is set to either ERDAS IMG file or All files. Highlight the file name and click on the <OPEN> button to bring up the Pick Projection Parameters window. Here you need to set the proper UTM Zone and Hemisphere.
NOTE: that as you change the UTM Zone the longitude bounds of that zone are displayed to the right of the data entry field. This allows you to double check your zone.

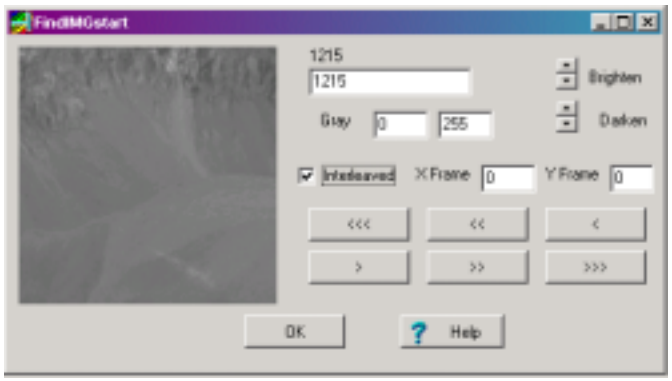


If you don't know what zone your data is in you may find the section on CARTOGRAPHY - Displaying the MGRS Grid Zones and 100K Grid Zones useful. After you make the proper entries and click on the <OK> button the Find IMG Start window will pop up.



MicroDEM will make a best-guess on the proper starting point for the image. If the image is gray scale you should be able to simply click on the <OK> button to display it. If the image is a color/multispectral you'll need to check the Interleaved box before you click on the <OK> button.

If the image in the pre-view is not clear, if it has vertical or horizontal lines and blocks then the start position is incorrect and you'll need to manually change the start position by typing in the top data entry field or by clicking on the <<<,<<,<,>,>>,>>> buttons. This can be a tricky operation and you'll need to exercise patience. The Brighten and Darken controls allow you to change the image brightness to more easily see any flaws in the pre-view image. The Program now saves the starting location so you should only have to locate it once.



The image will initially come up in black and white or panchromatic gray-scale.

To view in multi-band (colors), right click on the display and select Band from the pop-up menu. This will bring up the Pick Bands for Display window.

Click on the Multiband radio button under Display mode in the lower right corner. You may also change which spectral band is displayed in which RGB color by changing the band combinations in the Multiband data entry fields. When you're satisfied with your choices click on the <OK> button to redisplay the image.

Open Geotiff Imagery

Geotiff or geo-referenced tif image files are a common commercial GIS format. Each image may be distributed as a single .tif, a .tif with an associated .tfw world file, or as set of four .tif, .tfw, .tDw and .tab files. Only the .tif and .tfw files are necessary for MicroDEM.

USGS DOQ files, USGS Digital Raster Graphics (DRG) map files and MrSID exported files are all available in the geotiff format.

Click on the <Open IMAGE> button → 

In the Open Satellite Image window navigate to the location of your geotiff file. Make sure that they Files of Type field at the bottom of the Open Satellite Image window is set to GEOTIFF or All files. Highlight the desire file and click on the <OPEN> button to display the file.

Open Digital Maps (ADRG, CADRG, or DRG)

Digital maps are scanned paper maps that have been geo-referenced and saved in various digital formats. You can use them in MicroDEM and other software to display or print more paper copies. Remember to make note of the original datum the map was printed in. The UTM grid lines on the map will still be in the **original** datum. If you plan to use a different datum, such as WGS-84 in MicroDEM then you may need to provide a grid overlay of the proper datum and inform your users of the purpose of the overprinted grid.

NOTE: You may display an image/map by itself for simple viewing; however, it is best to first open an elevation file covering the same area before you open your imagery/map files. Opening your elevation file and image/map together will allow you to perform many types analysis and create many 3D views.

Open ADRG Map Files

Arc Digitized Raster Graphics (ADRG) data is produced by NIMA and may be ordered through your supply system and the Defense Logistics Agency. ADRG maps are distributed as a single tiled .img (not the same as ERDAS Imagine .img) file and a .thf header file. The amount/area of the map you will display is set in the OPTIONS/IMAGERY in the ADRG X tiles and ADRG Y tiles data entry fields. The default setting is 8 x 6 tiles. An entire 1:50 TLM map is usually about 43 x 46 tiles. Remember that the larger the original image you load the more you'll have to zoom in to see the features.

Click on the <Open Scanned Map> button → 

In the Open Digitized Map window navigate to the location (normally the CD drive) of the .THF file. You may need to insure that the Files of Type field at the bottom is set to ADRG map or All files. Highlight the file and click on the <OPEN> button to display the map Overview. The map overview image will show all the tiles of the complete map. Double click on the center of the area you wish to load. MicroDEM will then go to the CD and extract the section of the map you have indicated. Once displayed you will have additional toolbar buttons available to pan/move around the map.

Open CADRG Map Files

Compressed Arc Digitized Raster Graphic (CADRG) data is made by NIMA and is a compressed form of ADRG (55:1 ratio). **NOTE:** CADRG opens exactly the same way as CIB imagery using the A.TOC file.

Click on the <Open Scanned Map> button → 

This opens the Open Satellite Image window. Make sure you have your Files of type field set to CADRG Index or All Files. Here you will navigate to the file location, normally a CD drive, of the RPF folder and double click on the A.TOC file. If you have your elevation data displayed, the footprint of the available CADRG tiles will be displayed over your elevation data. If you do not have your elevation data already displayed, the foot-print of the available CADRG tiles will be displayed in the world vector .sin map

Double click on the northwest corner of the area you wish to display, hold down the mouse button and drag to the southeast corner before releasing. The selected tiles will be displayed as a seamless mosaic.

A second method of opening CADRG allows you to open any one of the individual tiles. Be aware that the file naming convention for CADRG tiles does not allow you to determine the location of a tile by its name alone. Also be aware that different scales of CADRG use different file extensions you must therefore set the Files of Type in your Open Satellite Image window to CADRG small scale (GNC, JNC, ONC), CADRG JOG, CADRG topo (TLM), CADRG Misc or All files. Search in the sub folders under the RPF directory and select the desired file. Remember that this is not the recommended method for displaying CADRG imagery.

If you are attempting to load a 'Special' or non-standard product you may be asked if you would like to restrict the type of files you are looking for. If you know the scale of map you want to use, select <YES> and select the scale so that only that scale selection footprint will open. If you want to see all of the scales of maps and their coverage, select <NO>.

NOTE: CADRG maps are sub-sampled spatially and spectrally so that their quality is reduced from that of ADRG. In order to improve the image quality when zoomed-out to small-scale you should go to Main Menu and select OPTIONS/IMAGERY then check the Average zoomed out imagery box. Once you have zoomed-in to a large-scale view you'll need to switch this feature off or your map will be too blurry. Each time you switch the feature back and forth you'll need to redraw your map by simply clicking on the <FORCE REDRAW> button → 

Open DRG Map Files (geotiff)

Digital Raster Graphics (DRG) data is made by the USGS and available through commercial venders, directly through the USGS or by special request through NIMA). Since USGS products may be freely distributed once purchased you can usually find the DRG for the whole state at one of the state colleges or other GIS institutions.

Click on the <Open Scanned Map> button → 

In the Open Digitized Map window navigate to the location (normally the CD drive) of your DRG file. You may need to insure that the Files of Type field at the bottom is set to Geotiff or All files.

To select the map with the desired map coverage, either use the hard copy USGS State Index to map coverage, or, if you have a hard copy of the USGS map, look up the same reference number (5 or 6 digit Latitude/Longitude number followed by the quad designation).

NOTE: DRG maps are scanned at a high spatial resolution (typically about 6000 x 6000 pixels) and whole map sheets will display very poorly. In order to improve the image quality when zoomed-out to small-scale you should go to Main Menu and select OPTIONS/IMAGERY then check the Average zoomed out imagery box. Once you have zoomed-in to a large-scale view you'll need to switch this feature off or your map will be too blurry. Each time you switch the feature back and forth you'll need to redraw

your map by simply clicking on the <FORCE REDRAW> button → 

NOTE: Merging multiple DRG maps into one large seamless map sheet is covered in the section on Data Manipulation.

Editing the Display

In this section we will cover several different methods for modifying your map displays.
Editing Files with Paint
Spot Elevations
Point Symbols and Text
Map Icons
Military Icons
Heads Up Digitizing AutoCAD .DXF Files
Heads Up Digitizing Shape Files with Database Attribute Files
Printing, Print to Scale and Print Preview
PowerPoint and MicroDEM
Editing Files with Paint

This is an old method of adding operational graphics and other symbols to your display, inherited from previous versions of MicroDEM/TerraBase II. To edit your display select FILE/EDIT IMAGE at the Main menu.

This will call up your computer's default Paint/Drawing program which will open with a copy of your current MicroDEM display. After you have made the desired changes and annotations, select File/Save from you drawing programs menu. This will save the image as 'working1.bmp'. Exit your drawing program.

In MicroDEM go to the Main menu and select FILE/LOAD IMAGE. The edited image will replace the existing display file.

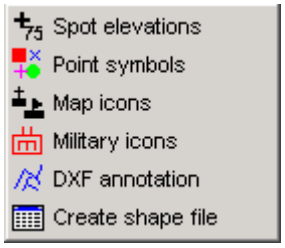
NOTE: Once you have edited your display you cannot alter its scale/size so you should give some thought to the size of your final product before you perform this step.

Spot Elevations

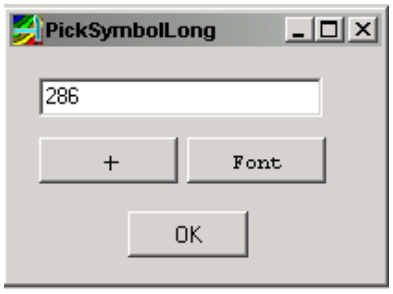
The new map editing and data creation functions have been consolidated under one icon on your display GUI menu bar. To bring up the list of available map annotation functions click on the

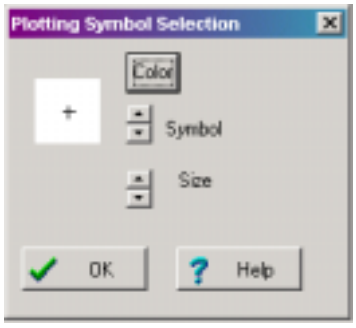
<Map Annotation> button → 

To place a point symbol with its printed elevation on your display select SPOT ELEVATIONS from the menu list. **NOTE:** You must have elevation data displayed for your AOI for these functions to be available.



Next, double click on the desired location for placement of your Spot Elevation on your display. This will bring up the Pick Symbol Long window. Here you may change the point symbol by clicking on the <+> button to bring up the Plotting Symbol Selection window where you can alter the color, size and symbol used to mark the spot elevation.



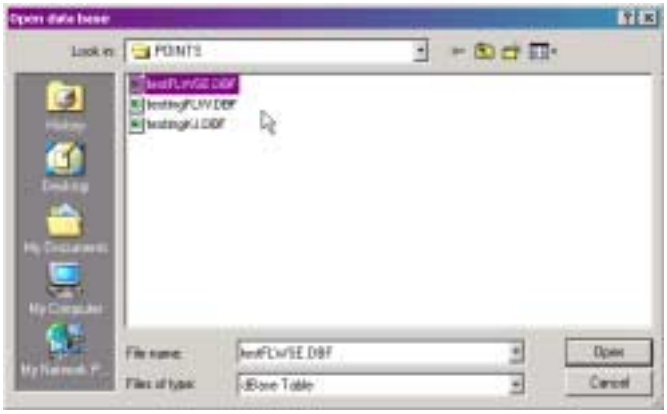


Clicking on the <Font> button will bring up the standard windows Font selection window where you can select the font type, style, size and color you desire.

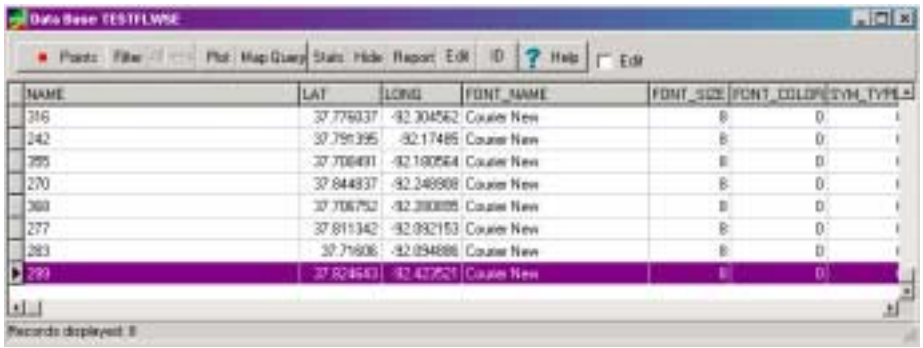
Do not change the actual elevation in the Pick Symbol Long data entry field. When you're satisfied with the selections you've made simply click on the <OK> button at the bottom of the Pick Symbol Long window to plot the point.

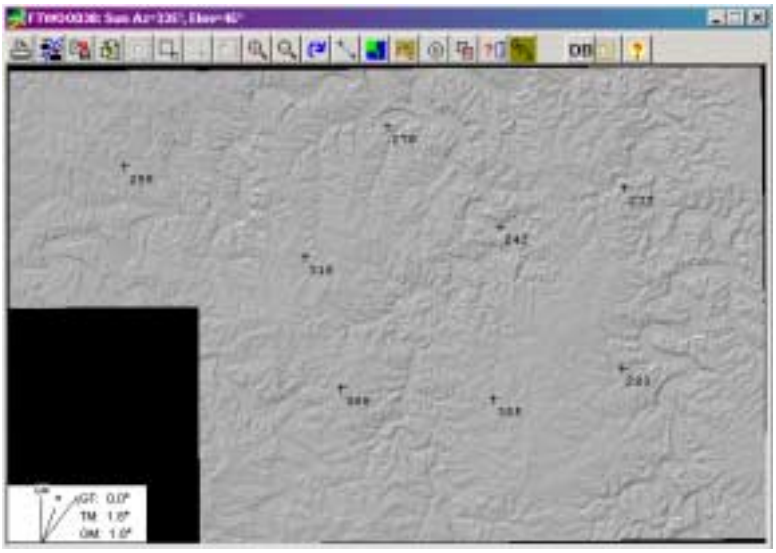
Redisplay Spot Elevations, saved for your AOI, by clicking on the <DB> button → 

This will bring up the Open data base window.



This will bring up the Data Base table for your spot elevations and display the points on you map background.





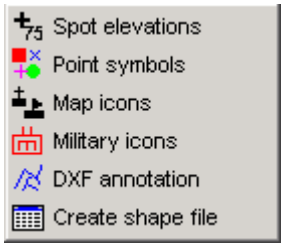
Point Symbol Overlays are removed by selecting OVERLAY / OVERLAY MANAGER at the main menu. This will bring up the Map Overlay Manager window. **NOTE:** If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

Point Symbols and Text

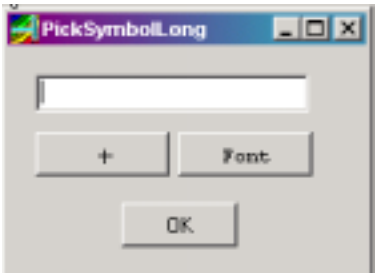
To bring up the list of available map annotation functions click on the

<Map Annotation> button → 

To place a point symbol and associated text on your display select POINT SYMBOLS from the menu list. **NOTE:** You must have elevation data displayed for your AOI for these functions to be available.

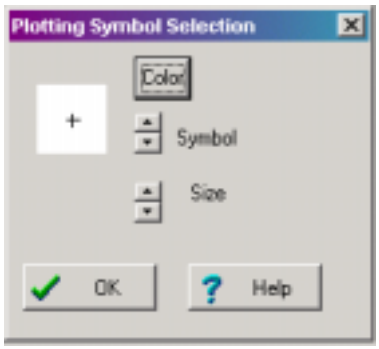


→



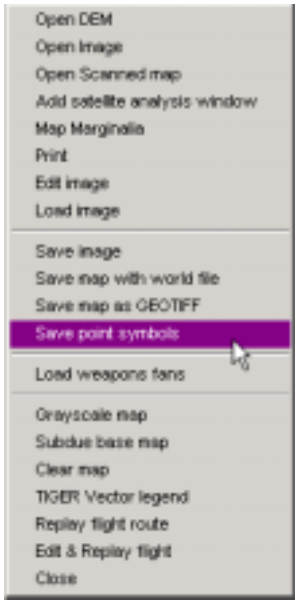
Next, double click on the desired location for placement of your Point Symbol and text on your display.

This will bring up the Pick Symbol Long window shown above. Here you type the text you wish plotted in the data entry field. You may change the point symbol by clicking on the <+> button to bring up the Plotting Symbol Selection window where you can alter the color, size and symbol used to mark the spot elevation.



Clicking on the <Font> button will bring up the standard windows Font selection window where you can select the font type, style, size and color you desire.

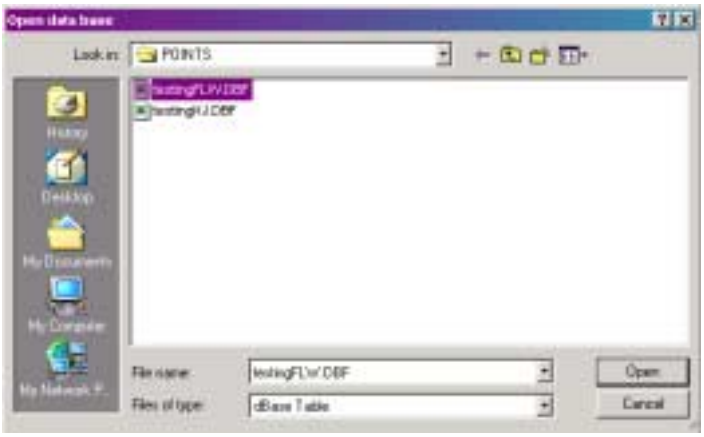
When you're satisfied with the selections you've made simply click on the <OK> button at the bottom of the Pick Symbol Long window to plot the point.
Save your map symbols database files for future use by going to the main menu and selecting FILE/SAVE POINT SYMBOLS.



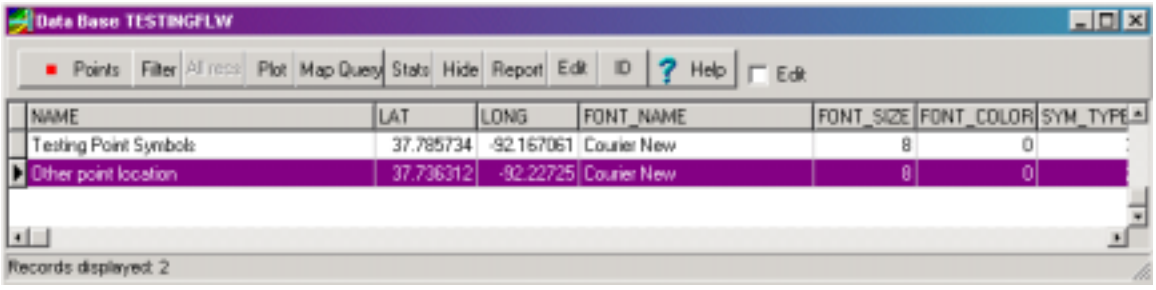
Redisplay Point Symbols by using the FILE / LOAD POINT SYMBOLS function from the main menu.

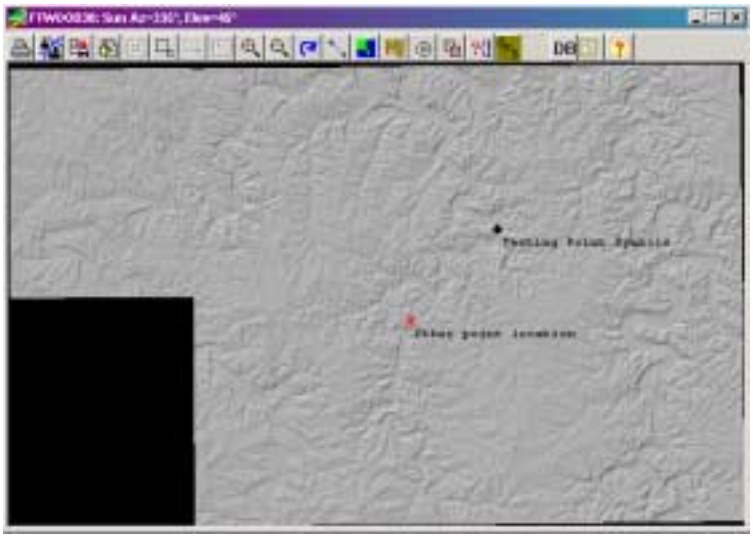
An alternative method for reloading Point Symbols is to display the background data for your AOI then click on the <DB> button → DB on the displays GUI bar.

This will bring up the Open data base window.



This will bring up the Data Base table for your point symbols and display the points on you map background.

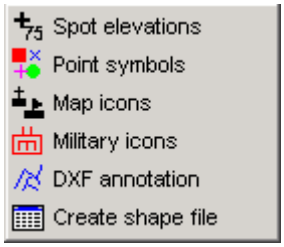




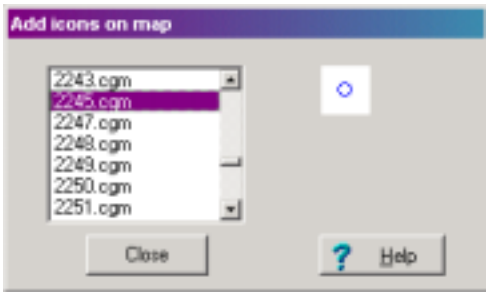
Point Symbol Overlays are removed by selecting OVERLAY / OVERLAY MANAGER at the main menu. This will bring up the Map Overlay Manager window. **NOTE:** If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

Map Icons

To open the Map Icons editor click on the <Map Annotation> button → 
This will bring up the Map Annotation pop-up menu.



→



NOTE: You must have elevation data displayed for your AOI for these functions to be available. Select Map Icons from the list to bring up the Add Icons On Map window. This will bring up the Overlaid Icons window where you type a unique file name to save the overlay.

NOTE: Spot elevations and Point Symbols and Text are stored together in one database file. The overlay will appear in your OVERLAY/OVERLAY MANAGER where it may be resorted or deleted. See the previous section on the Overlay Manager in Chapter 1. The Map Icons overlay may be redisplayed at any time over any type of data for the same area and will be scaled to fit your current display.

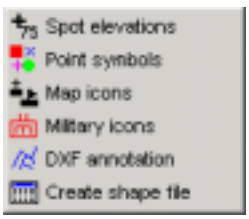
From the Add Icons on map window you can select any Computer Graphics Metafile(CGM), GIF or BMP image from the list and place it on your map by double clicking on the desired location on your display background. When you are finished placing your graphics simply click on the <CLOSE> button to close the window and save your overlay data.

NOTE: CGM files may be sized by changing the value in the CGM Symbol Size data entry field under OPTIONS/VECTOR MAPS. GIF and BMP imagery must be pre-sized for standard display/map scales before they are placed in your ..\Mapdata\Icons directory. You may add any imagery you wish to this directory as long as it is in the .cgm, .gif or .bmp format.

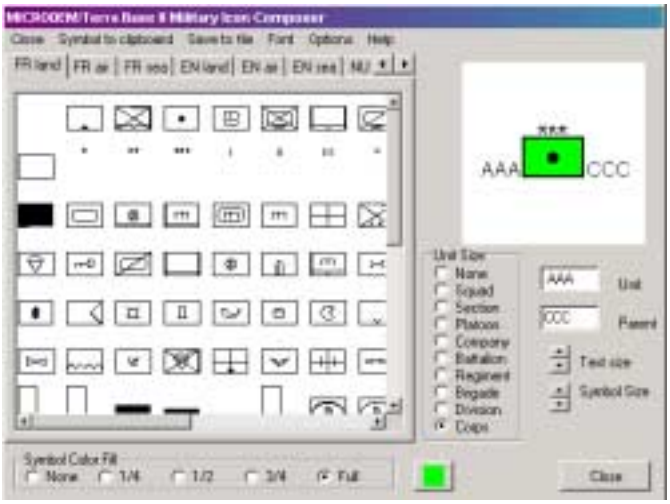
Military Icons

To open the Military Icons editor click on the <Map Annotation> button → 

NOTE: You must have elevation data displayed for your AOI for these functions to be available. This will bring up the Map Annotation pop-up menu.



Select Military Icons to bring up the MicroDEM/TerraBase II Military Icon Composer window. You will be asked to provide a unique file name to save the overlay.



Select the desired type of icon from the FRiendly land, FRiendly air, FRiendly sea, ENemy land, ENemy air, ENemy sea, NeUtral land, NeUtral air, NeUtral sea, Map Sym, Mil Sym or Other tab. You may color the Friendly, Enemy and Neutral symbols by checking the None, 1/4, 1/2, 3/4 or Full radio button in the Symbol Color Fill section at the bottom of the interface.
You may select the desired color by clicking on the colored button to the right of the Symbol Color Fill radio buttons.

You may add unit size symbols to Friendly, Enemy and Neutral symbols by choosing the desired radio button from the Unit Size selection area. Click in the Unit data entry field to type text that will appear to the left of your icon and in the Parent data entry field to type text that will appear to the right of your icon.

Text size and symbol size may be adjusted by clicking on the Text size and Symbol size control arrows at the lower right corner of the interface.

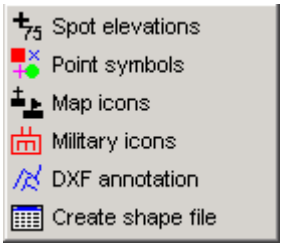
NOTE: Keep an eye on the symbol you're building in the display at the upper right hand corner of the interface. Any part of the text or symbol that does not appear in this white box display area will not appear on your map. Some sizes do not scale well; if this happens, you should increase or decrease the symbol size until its appearance is satisfactory.

Heads Up Digitizing AutoCAD .DXF Files

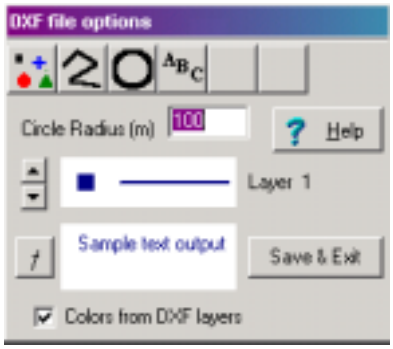
To open the Military Icons editor click on the <Map Annotation> button → 

NOTE: You must have elevation data displayed for your AOI for these functions to be available.

This will bring up the Map Annotation pop-up menu.



Select DXF annotation to bring up the DXF file options window.



You may select from fifteen pre-defined symbol layers by clicking on the control arrows in the middle of the interface. You may mix the layers on any overlay as needed.

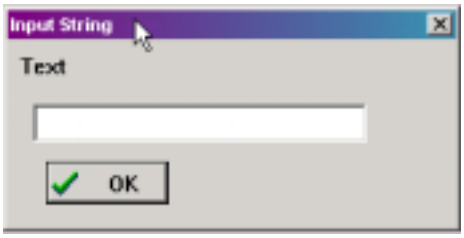
Clicking on the first Point symbols button will allow you to place point symbols on your map by double clicking on the desired location of your map display.

The second Polyline button will allow you to digitize lines and polygons by double clicking nodes on your map display. When you have finished delineating your line or polygon simply right mouse click and select End polyline to terminate the line or select Close polyline close the polygon.

Selecting the third <Circle> button will allow you to place a circle on your map display whose radius, in meters, is defined in the Circle Radius (m) data entry field.

You may select the font characteristics of your text by clicking on the <f> button that will bring up the Font selection window.

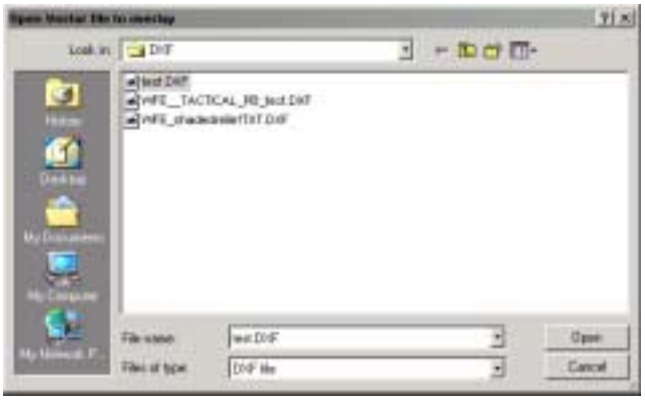
Clicking on the fourth <ABC> Text labels button will allow you to double click on your map display to identify the starting point of your text. This will bring up a small text entry window where you will type your text.



Once you have finished editing your .dxf overlay you must click on the <Save & Exit> button. Here you'll give the overlay a unique file name under which it will be saved. The overlay may be distributed to other users of AutoCAD or similar Computer Aided Design (CAD) software or other MicroDEM/TBII users. Some aspects of these DXF files (notably text font descriptions) are not standard, and will probably not display correctly in other programs.

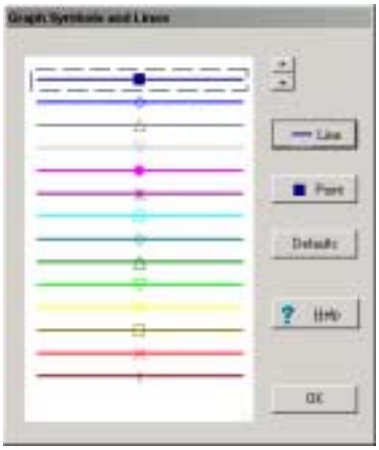
While your overlay is loaded it will appear in the stack of your OVERLAY / OVERLAY MANAGER . You may drag and drop any of the overlays to alter the order in which your overlays are displayed. This is where you will delete any or all of your overlays by dragging them to the trash can. **NOTE:** If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

You may reload or re-display your .dxf overlay over any other data for the same area by going to the main menu and selecting OVERLAY / VECTOR OUTLINES. This will bring up the Open vector file to overlay window.



Here you will need to select DXF file or All files from the Files of type list at the bottom of the window. Once you have selected the desired file it will be scaled to fit your current map display.

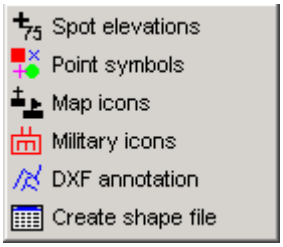
You may change the default color, size and type of the points symbols and the color and weight of the line symbols for each of the fifteen pre-defined layers by selecting OPTIONS / VIEWS <DXF OVERLAY COLORS> which will bring up the Graph Symbols and lines window.



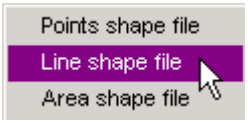
Heads Up Digitizing Shape Files with Database Attribute Files

To start Shape file digitization click on the <Map Annotation> button → 

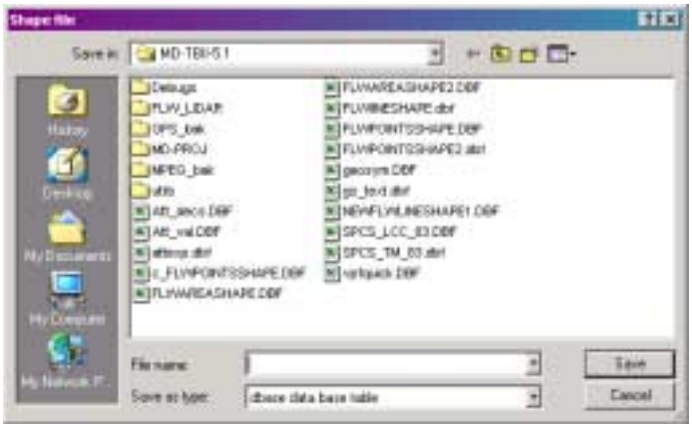
This will bring up the Map Annotation pop-up menu. **NOTE:** You must have elevation data displayed for your AOI for these functions to be available and function correctly.



Select Create shape file to bring up the shape feature selection list.

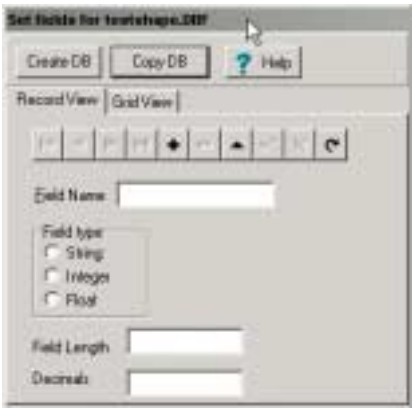


Select point, line or area features to be digitized. This will bring up the Shape file- naming window where you give your database file a name. After you've entered the file name click on

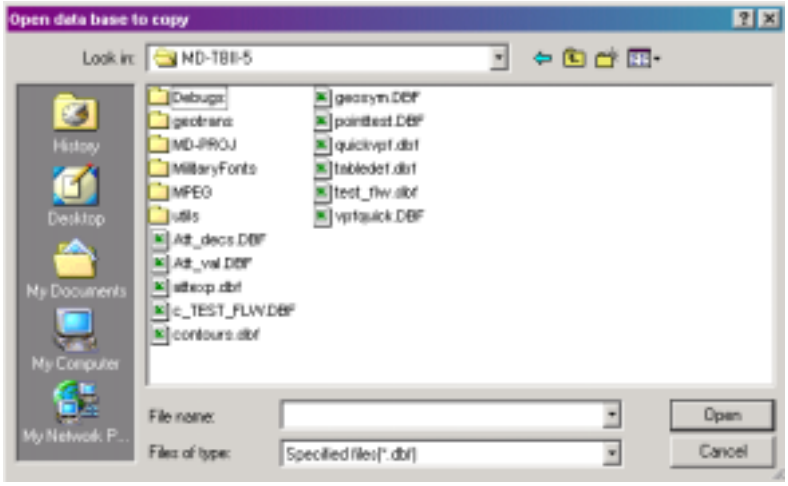


the <SAVE> button, this will bring up the Set fields for database window where you'll create your database table structure.

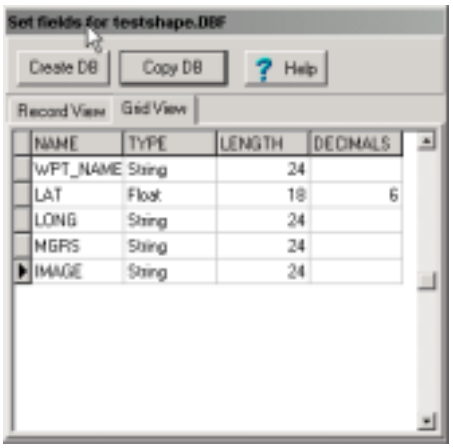
If you wish to duplicate the structure of a pre-existing database simply click on the <Copy DB> button in the Set Fields for database-name.dbf window.

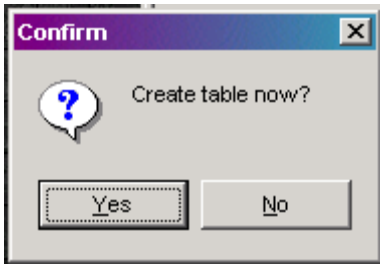


This will bring up the Open Database to Copy window where you will navigate to and select the database file whose structure you wish to copy.



You will be shown the structure of the selected database and will be asked to confirm the selection you have made by clicking on the <YES> button in the Confirm pop-up window.





After clicking on the <YES> button you may begin digitizing your feature by double clicking on your display.

If you want to create the data base table from scratch, you will begin working to design the data base. You should already have an idea what attributes or information you want to store about the features you are digitizing. The information for individual points, lines or polygons will each be stored in a separate record or line of your database table. Field names in this table are limited to 10 characters, and cannot use a blank space (the underscore) is frequently used instead. You may wish to store the specific name of a feature in a field called 'NAME'. You may wish to store the load classification of a bridge in a field called 'LOAD_CAP' or you may wish to store the location of a corner or center point of your feature in a field called 'MGRS'.

NOTE: If you forget to include a column/ field in your database you may add it at a later date. See Chapter 6 Adding Data Fields to Shape Database Files.

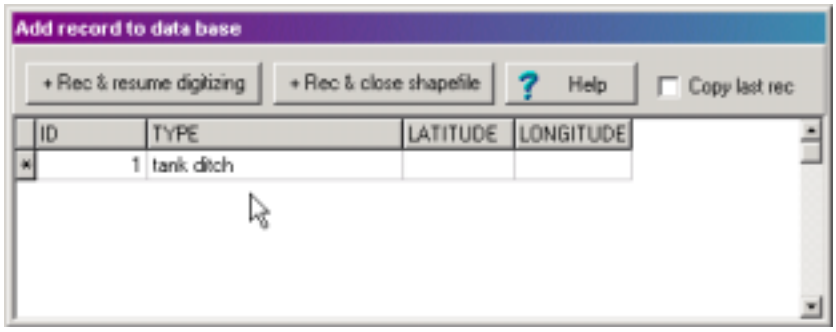
In the Set fields for database window type the title or column header of the field name in the Field Name data entry field then select the field type from the Field type radio selection buttons. If the default field length and number of decimals are not long enough then you may change them in the Field length and Decimals data entry fields.

Click on Grid View tab to see the table you've created. It may be necessary to toggle back and forth between the Record View and Grid View tabs to properly display all new fields.

When you're ready to start digitizing click on the <Create DB> button →

Start digitizing by double clicking on each point on your map display.

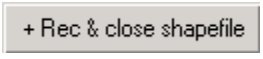
When you have finished digitizing simply right click to bring up the Add Record to Database window.



Here you can type in the required attributes under each column for each feature you have digitized.

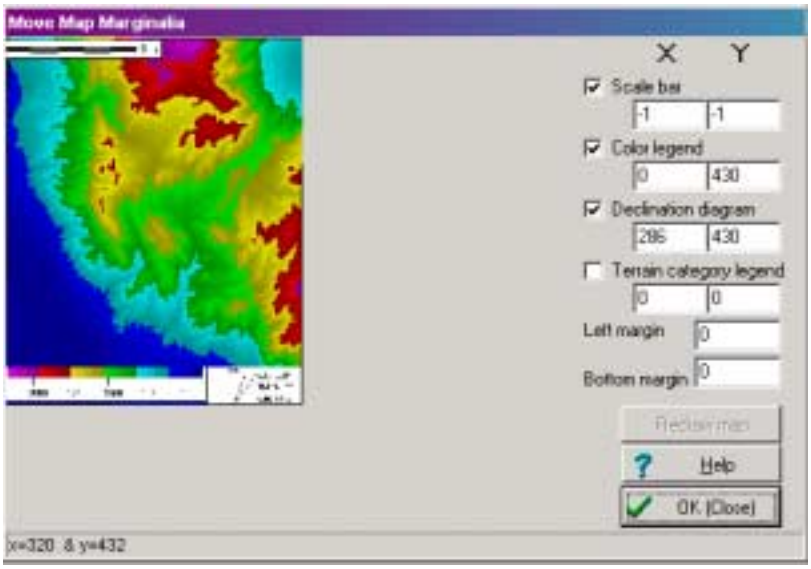
To continue digitizing click on the <+Rec & resume digitizing> button →

When you have completed digitizing and typing attribute information in the database simply click on the <+ Rec & close shapefile> button →



Placement of Marginalia

Marginal data such as legends, scale bars and declination diagrams may be placed anywhere within the map display or border of your map display. The specific placement of the individual components is accomplished by selecting FILE and MAP MARGINALIA at the main menu.



This will bring up the Move Map Marginalia window with a small version of your main display and the controls to place the scale bar, color legend, declination diagram and terrain category legend. To enable the feature simply check the box and type in the proper X, Y (pixel) coordinates for placement.

The screen coordinates of the current mouse pointer position are displayed in the lower left corner as you move your mouse pointer over the face of the duplicate display.

Click on the <Redraw map> button → 

to redraw your display with the changes.

Click on the <Close> button → 

when you are done.

NOTE: Left and Bottom margins are only available for elevation displays for the present time. These fields will be grayed-out for other products. Imagery and map displays will require placement of scale bars and legends within the body of the display.

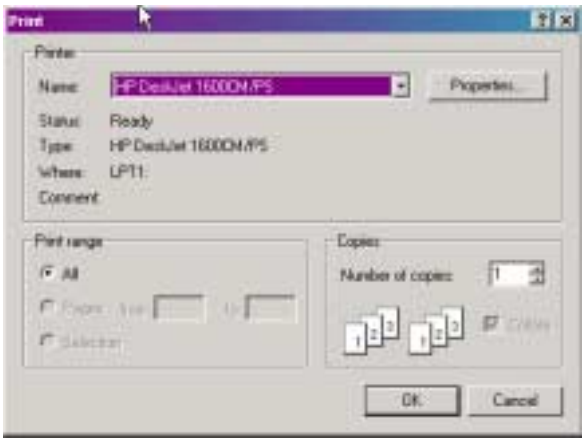
Printing, Print to Scale and Print Preview

Quick print allows you to print your current display to a single page on your printer.

Select the <PRINT> button → 

This will bring up the print selection pop-up window.

Selecting Quick print current screen bring up the printer driver for your default windows printer.

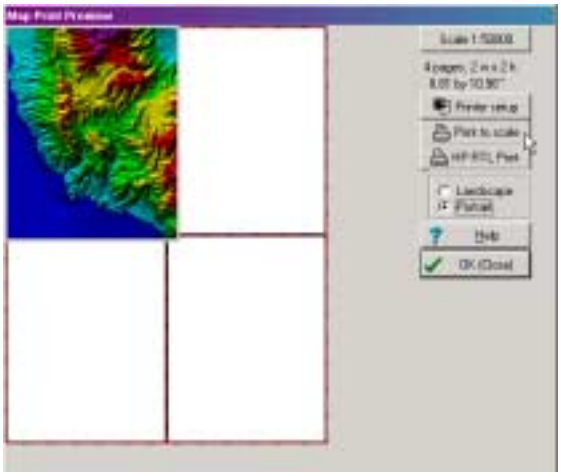


Here you may select an alternate printer and set your printer properties. Follow standard print instructions to select the printer defaults. When ready click the <OK> button to print your display to a single page.

Print Preview allows you to print your current display to scale on one or more sheets of paper.

Selecting Print preview & print to scale 

from the print list will bring up the Map Print Preview window.



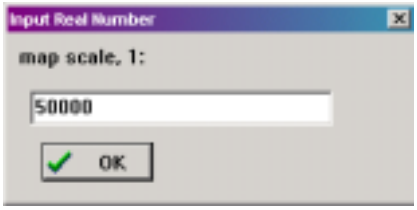
Select the <Printer setup> button → 

This will bring up the printer driver interface for your chosen printer.

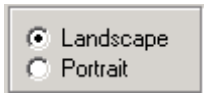
Here you may select an alternate printer and set your printer properties. Follow standard print instructions to select the printer defaults. When ready click the <OK> button.

Click on the <Scale> button → 

to bring up the Input Real Number popup.



Here you should enter the scale for you map output. You can experiment with various scales and see the number of pages and actual output size in inches displayed in the Map Print Preview interface. When you are ready click on the <OK> button to close this popup window and return to the Map Print Preview window.

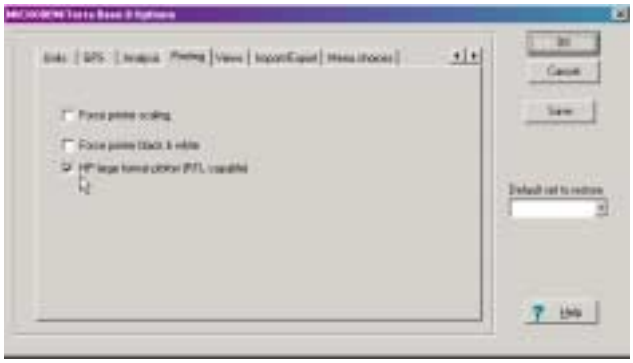
Click on the proper output format Landscape/Portrait radio buttons. → 

(This only affects HP RTL printing.)

If you are using a standard printer click on the <Print to scale> button → 

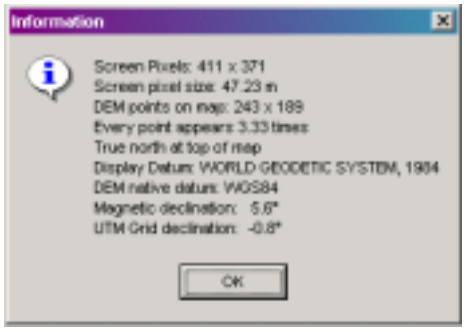
If you are using a Hewlett Packard plotter click on the <HP RTL Print> button → 

NOTE: This option is disabled by default; if you have an RTL capable plotter and want to use it you will need to check the HP large format plotter (RTL capable) box in OPTIONS under the Printing tab.



Your map will now be printed. If you have a slow computer, are printing a large file or are printing at a large scale this may take awhile. To close the Map Print Preview window click on the <OK(Close)> button → 

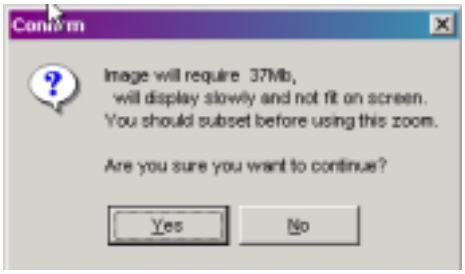
NOTE: The quality of the hardcopy output from quick print and print preview will depend on the **on-screen quality** of your display. For best results you should zoom-in your display to as close to full resolution as possible on your computer. To check your current display quality go to the Main Menu and select INFO this will bring up the Information window.



The fourth line "Every point appears 3.33 times" shows that I'm displaying every ground pixel 3.33 times. Anything better than or approaching 1.0 times will provide good quality output.

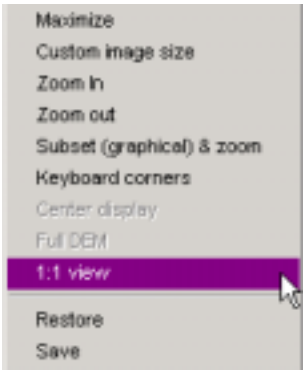
Use the <1:1View> button →  to display each ground pixel as one screen pixel.

Large areas of high-resolution data may push the limits of RAM and virtual drive space on your PC. When you begin to strain your PC's capabilities you will receive the following Confirm window.



The point that each computer will give-up-the-ghost and crash will vary from PC to PC and will depend on the size of the file and type of data you are displaying. You should make note how your own computer behaves with each different type of data.

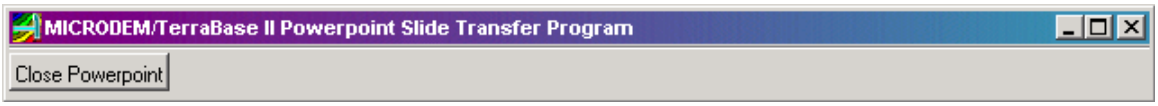
Alternatively, you can select a 1:1 display with the Modify, Map, 1:1 view menu choice.



Power Point and MicroDEM

To put MicroDEM images or products into Power Point briefing go to the Main Menu GUI buttons and select the <Power Point Presentation> button → 

This will start PowerPoint and bring up the MicroDEM/TerraBase II Power Point Slide Transfer Program window.



Highlight the title bar of the map display you wish to capture and click on the <Add Image to Power Point Presentation> button → 

When you've transferred all the images from your MicroDEM displays remember to save your PowerPoint presentation before closing Power Point.

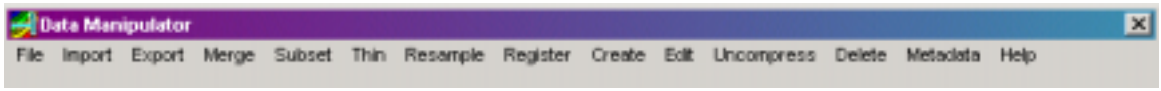
Data Manipulation: Subset and Merge Data Files

This collection of tools give you a great deal of flexibility in importing data, exporting data and creating your own tailored DEM, imagery and map files. These functions are especially helpful in creating smaller files for specific missions, or merging files if you need a larger area or a subset that falls on the boundary of two or four files. There are many functions in Data Manipulation; this tutorial covers the primary two – Merge and Subset.

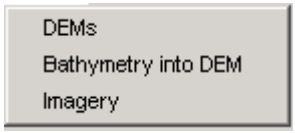
Merge Elevation Files

Select the <DATA MANIPUL ATION> button → 

This will bring up the Data Manipulator window with the following menu.



Select MERGE to bring up the merge products list.



Selecting DEMs from the list will bring up the Open Merging window.

Navigate to the correct directory of the files you want to merge. Select the desire elevation file and hit the OPEN button or double click on the file name. The file will be added to the list in the Data Manipulator window.

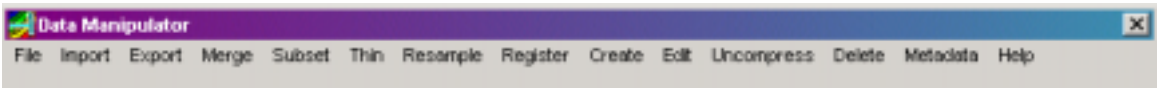
Continue to select elevation files you wish to merge. When you have selected all desired files to merge click on the <Cancel> button.

At the Merged DEM window type the name for the merged file and click the <SAVE> button. A series of Loading DEM progress bars will pop-up, one for each cell your are merging, followed by Writing New DEM and Checking Elevations progress bars. Your file now becomes a DEM whether it was initially a DTED file or DEM.

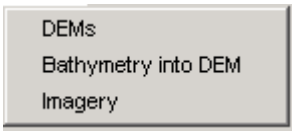
The merged DEM will be displayed along with a Information window which will allow you to close the temporarily displayed DEM by clicking on the <OK> button.

After you've closed the temporarily displayed DEM close the Data Manipulator window by selecting FILE/CLOSE or by clicking on the <X> button at the top right corner.

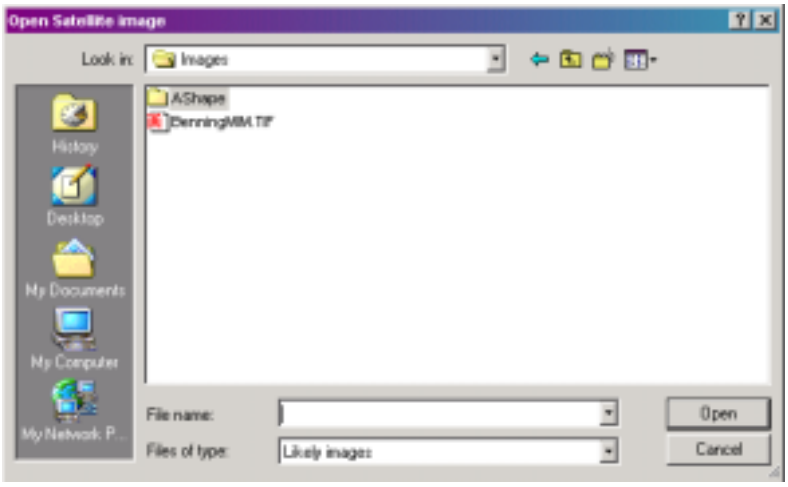
Merge USGS Image and Map Files



At the Data Manipulator menu select Merge to bring up the popup menu.

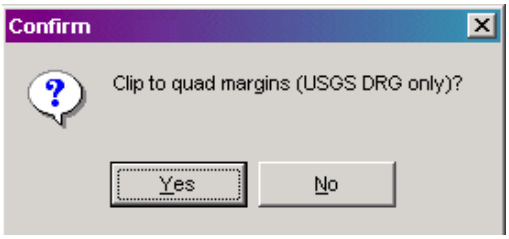


Selecting IMAGERY from the list will bring up the Open Satellite Image window. Navigate to the correct directory of the files you want to merge.



NOTE: MicroDEM does not currently support merging Arc Digitized Raster Graphics (ADRG). This procedure is for merging USGS Digital Raster Graphics (DRG) Maps and Digital Orthopoto Quads (DOQQ). Merging Compressed Arc Digitized Raster Graphics (CADRG) is accomplished by creating a new A.TOC or area table of contents files and is covered in Chapter 5 Advanced Functions.

Continue to select the files you wish to merge. When you have selected all desired files to merge click on the <Cancel> button. This will bring up the Confirm window. Select <YES> if you are merging Digital Raster Graphics (DRG) maps and select <NO> if you are merging Digital Orthophoto Quads (DOQQ). Answering <YES> will strip the marginal data that was scanned along with the paper map.



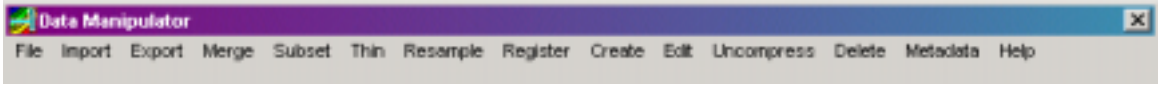
At the Image Merge window type the name for the merged file and click the <SAVE> button.

Close the 'Data Manipulator' window by selecting FILE/CLOSE or by clicking on the <X> button at the top right corner.

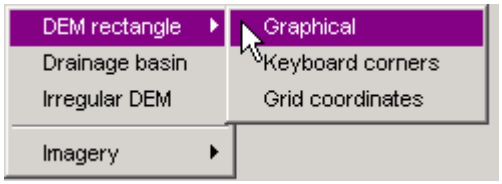
Subset Elevation Files with a Rectangular Border

Select the <DATA MANIPUL ATION> button → 

This will bring up the Data Manipulator window with the following menu.



Select SUBSET to bring up the product subset menu.

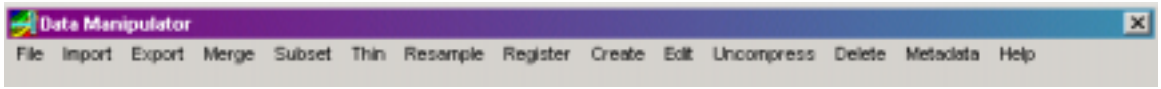


Select DEM RECTANGLE and GRAPHICAL. This will bring up the Open New DEM window where you will navigate to the specific elevation file you wish to subset. Once you've selected the file it will be displayed in MicroDEM. The next step will be to click on the northwest corner of the desired subset, holding the left mouse button down drag to the southeast corner of the desired subset area. A Subset DEM window will open which will require you to designate the location and file name for the output file. The new elevation subset will be written. Close the graphical 'Selection Map' window by clicking on the <X> button at the top right corner of the display.

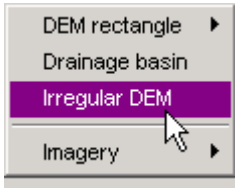
Subset Elevation Files with an Irregular Border

Select the <DATA MANIPUL ATION> button → 

This will bring up the Data Manipulator window with the following menu.

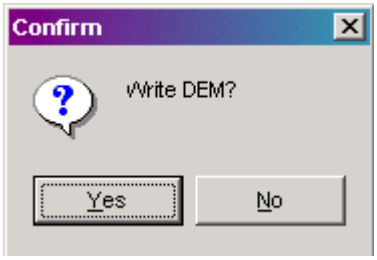


Select SUBSET to bring up the product subset menu.



Select IRREGULAR DEM. This will bring up the Open New DEM window where you will navigate to the specific elevation file you wish to subset. Once you've selected the file it will be displayed in MicroDEM.

Click on the elevation display with the mouse pointer to erase the elevation data you wish to delete. This acts just like an erasure function in a drawing program, be careful there is no undo option to correct mistakes. Once you've erased the data go to the Main Menu and select FILE / SAVE DEM EDITS. This will bring up a small Confirm window. Click on the <YES> button to accept your edits and write the new DEM.

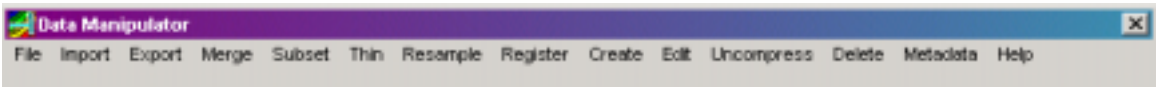


This will bring up the Extracted DEM window where you will designate the location and file name for your new elevation file.

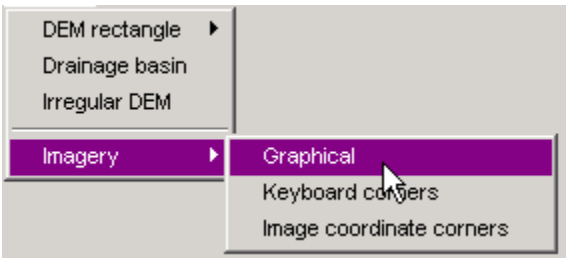
Subset Imagery

Select the <DATA MANIPUL ATION> button → 

This will bring up the Data Manipulator window with the following menu.

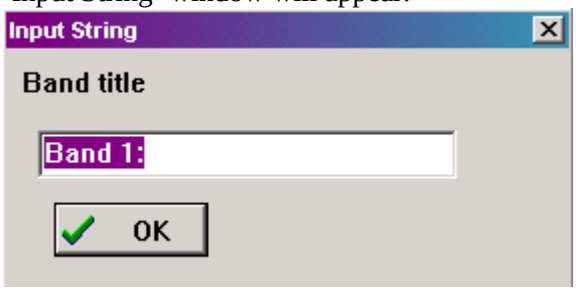


Select SUBSET to bring up the product subset menu.



This will bring up the Open Satellite Image window where you will navigate to and select the specific image file you wish to subset. The selected image will be displayed in MicroDEM.

Click on the northwest corner of the subset area and holding the left mouse button down drag to the southeast corner of the desired subset area and release. Once you've identified the area to be subset a New Image window will appear where you will designate the location and file name for the new image file. A Subsetting Band 1 progress bar will be displayed and when completed an 'Input String' window will appear.



Unless you have reason to change the Band Title simply click on the <OK> button to accept the default. Your new subset image has now been saved.

Loading and Displaying Data with the NIMA Database

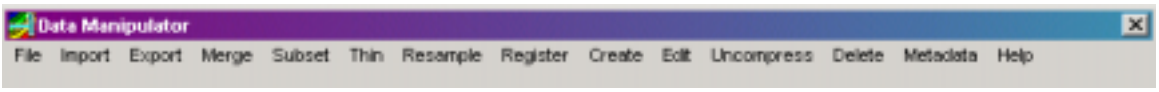
MicroDEM will allow you to copy NIMA DTED Level 1 and Level 2 elevation data, Controlled Image Base (CIB) 10 meter, 5 meter and 1 meter imagery and Compressed Arc Digitized Raster Graphics (CADRG) map data from CDROM to your hard drive, will keep track of what data you have loaded and will allow you to select and display all the data for an area with a simple one-step procedure.

NOTE: For best results the data CDROM must be in the drive before you select the following IMPORT / NIMA DATA FROM CD functions.

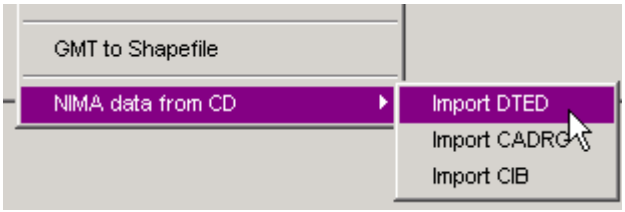
Loading Data to the Hard Drive

Select the <Data Manipulation> button → 

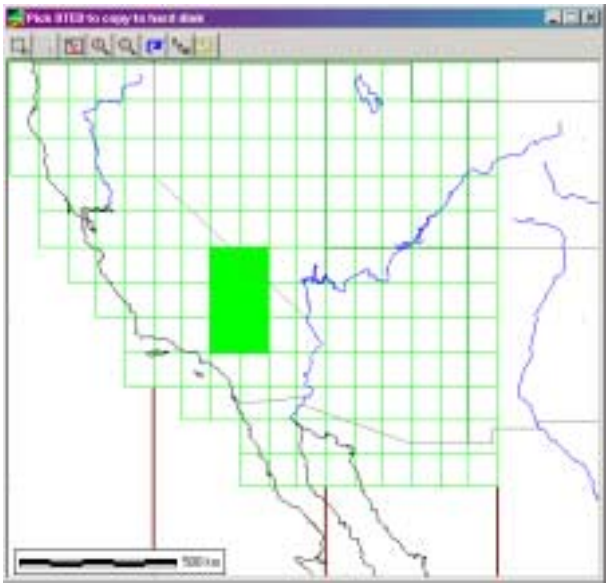
This will bring up the Data Manipulation window with the following menu bar.



Select IMPORT / NIMA DATA FROM CD and IMPORT DTED from the drop down menu.



This will bring up the Pick DTED to copy to hard disk window which displays footprint of the data available on the CDROM over a vector map of the area as shown below.

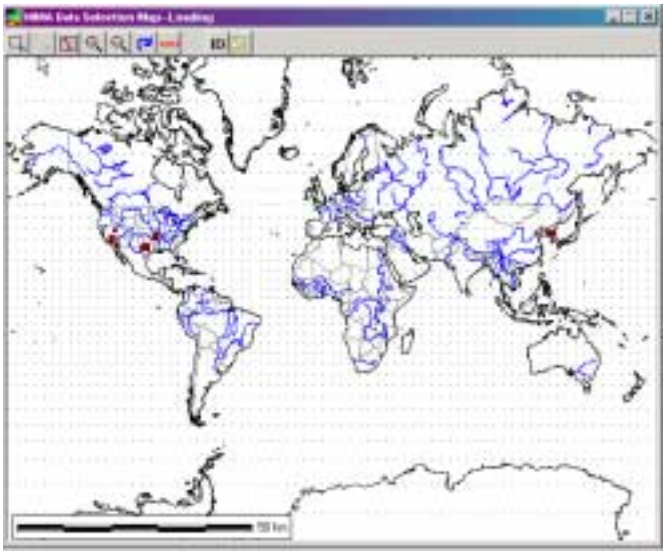


The available areas are within the green border cells with white backgrounds while the solid green cells are those you have already loaded. Brown vertical lines identify six degree wide UTM zones. Select the area you wish to load by clicking on the northwest corner of the area, holding down the mouse button and dragging to the southeast corner of the area you wish to load.

Displaying Data

Select the <NIMA> button from the Main Menu GUI → 

This will bring up a world vector map with the footprint of all the data you have loaded to your NIMA database.



Click on the <Subset & Zoom> button on the world map display → 
And select the region you are interested in.

Select the area you wish to display by clicking on the <Select NIMA data> button → 

click on the northwest corner of the area, hold down the mouse button and drag to the southeast corner of the area you wish to load.

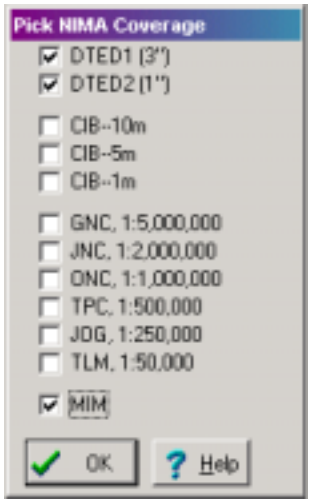
All of the DTED, CADRG and CIB that you have loaded for the area will be redisplayed. Each footprint is a different color to identify the data types and scales.

Series	File Extension§	Name	Scale	Default Color
GNC	GNx	Global Navigation and Planning Chart	1:5,000,000	Navy
JNC	JNx	Jet Navigation Chart	1:2,000,000 and 1:3,000,000	Aqua
ONC	ONx	Operational Navigation Chart	1:1,000,000	Silver
TPC	TPx	Tactical Pilotage Chart	1:500,000	Lime
JOG-A	JAx, JGx	Joint Operations Graphic	1:250,000	Teal
TLM	TLx	Topographic Line Map	1:100,000 to 1:25,000	Blue
MIM	MMx	Military Installation Map		Red
CIB	I1x, I2x	Controlled Image Base		Green
DTED®	DT0,DT1, DT2	Digital Terrain Elevation Data		Maroon

Once you've defined your area of interest (AOI) the data for the area will be displayed.

NOTE: In order to provide greater flexibility MicroDEM allows you to define what types of data will be displayed when selecting NIMA data from your NIMA database. This means that even though you may have elevation data, map data and image data transferred to your hard drive in the NIMA database, only those data types and scales you've check in this window will be displayed and available for use.

OPTIONS / PROGRAM / <NIMA SERIES> button will bring up the Pick NIMA Coverage window.



Chapter 3 Simple Tools

MicroDEM has a number of tools you can use to perform quick calculations and basic analysis. These tools can be used on elevation data, imagery and maps. **NOTE**: You must have the associated elevation data open for any slope-related calculations on maps and imagery, see Chapter 2.

Distance Measurements

Measures distance between two points on your display.

Click on the <CALCULATE DISTANCE> button → 

Double click on the display at the location of the starting point for the distance or route. Your cursor will now be drawing a reverse-video line. Double click the finish point or first intermediate point or node along your route. A Confirm window will appear giving you that leg's distance, bearing, and cumulative distance and asking if you want to "add another segment ?". Answering <YES> will allow you to continue to add segments along your route. The length of each segment is displayed along with the cumulative distance from your starting point.

Clean the reverse-video line segments from your display by clicking on the

<FORCE REDRAW> button → 

Slope Calculations

Measures the average slope between two points on your display.
At the main menu select CALCULATE / SLOPE.

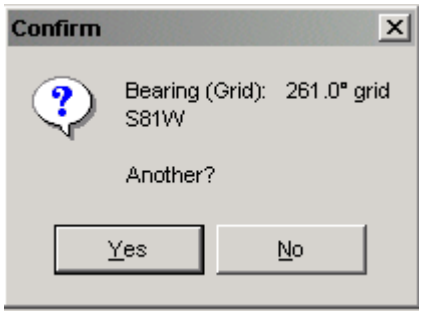
Double click on the start point for the slope. Your cursor will now be drawing a reverse-video line. Double click the end point. A Confirm window will appear giving you the average slope over the distance and asking whether you wish to perform another slope measurement. Each slope measurement is independent. If you wish to continue click the <YES> button. You must identify a new start and end point for each measurement. This function will end when you click the <NO> button

Clean the reverse-video line segments from your display by clicking on the

<FORCE REDRAW> button → 

Bearing

Calculates the bearing between two points on your display. At the main menu select CALCULATE / BEARING. Double click on the observer or start point on the display then double click on the target or end point. Notice that a reverse-video line is drawn on your display.



A Confirm window will appear giving you the bearing as both a 360 degree compass readout and in 90 degree quadrant readout such as 261.0 and S81W as shown above. Click on <YES> to calculate another bearing or click on <NO> to end this function.

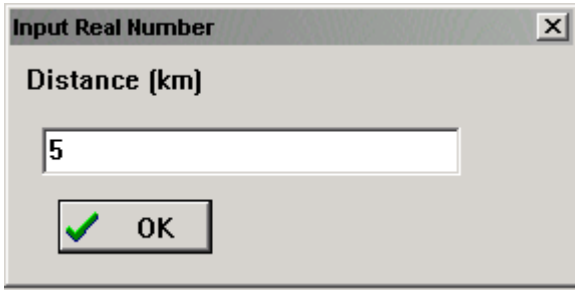
Clean the reverse-video line segments from your display by clicking on the

<FORCE REDRAW> button → 

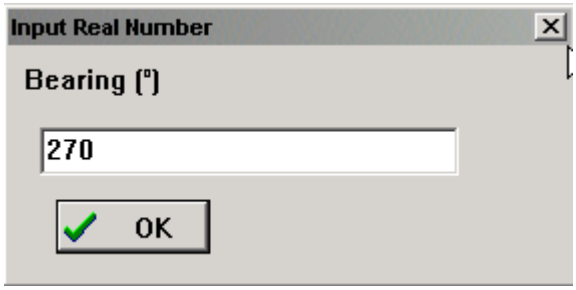
Offset

Plots a line of a given length along the specified bearing on your display.
At the main menu select CALCULATE / OFFSET.

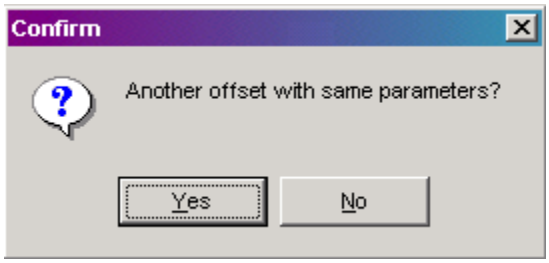
This will bring up a small Input Real Number window. Enter the distance of the in kilometers in the Distance (km) data entry field.



After entering your distance click on the <OK> button. This will bring up another Input Real Number window. Enter the compass bearing.



Double click on the start point on your display. This draws a line from a selected starting position for a given distance along the specified bearing. A small Confirm window will appear asking if you want to draw another offset with the same parameters.



If you wish to use the same parameters to draw another offset from another location on your display click the <YES> button and double click on the location on your display. If you do not wish to draw another offset simply click the <NO> button to end the function.

Clean the plotted line from your display by clicking on the

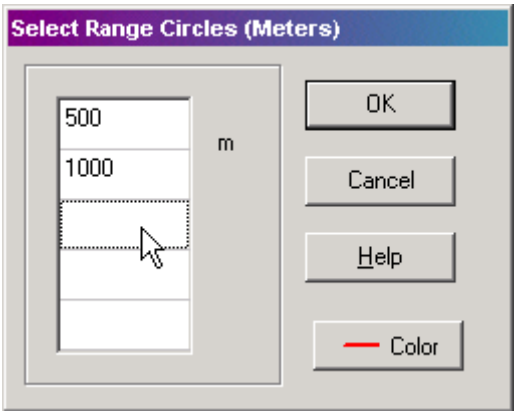
<FORCE REDRAW> button → 

Range Circles

This tool allows you to place range circles at specified locations on your display.

Click on the <RANGE CIRCLES> button → 

This will bring up a Select Range Circles window where you can enter the radius and color for up to five concentric circles.



After you have selected the desired ranges and color for your range circles click on the <OK> button to close the window. Double click on the display to plot the range circles with the current settings.

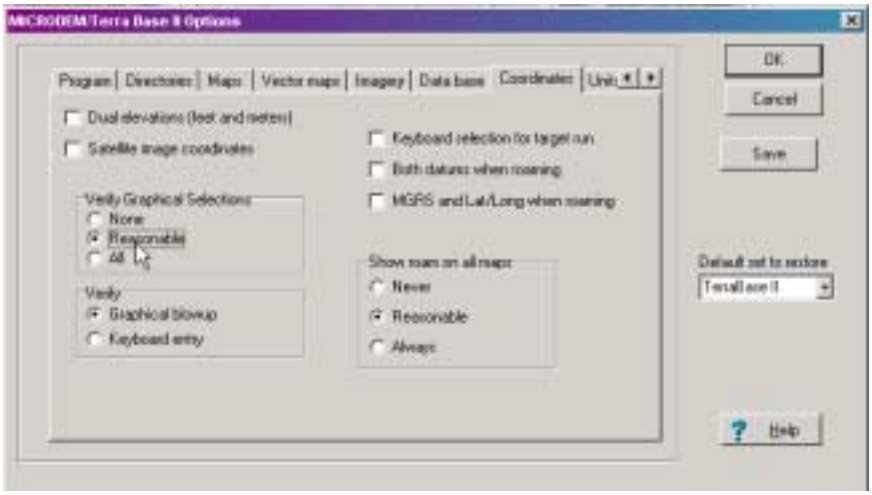
NOTE: These settings are straight-line distances NOT trajectories.

To remove the range circles overlay select OVERLAY /OVERLAY MANAGER at the main menu. This will bring up the Map Overlay Manager window, see page 8 Chapter 1.

HELPFUL HINTS FOR HIGHER ACCURACY POINT PLACEMENT: When using your mouse to graphically select locations for MicroDEM functions, you normally use the 8-digit grid coordinate display at the bottom of your display as your guide. This is quick and easy but may not be as accurate as you need for some functions. Some helpful techniques are to:

a. Overlay your DEM or image with contour lines so it can have a more map like appearance. To do this select OVERLAY / CONTOUR.

b. Select OPTIONS / COORDINATES/VERIFY GRAPHIC SELECTIONS and then select Reasonable as shown below. This will bring up a zoomed-in contour map for the immediate area around your initial selection so you can re-pick the point more accurately.



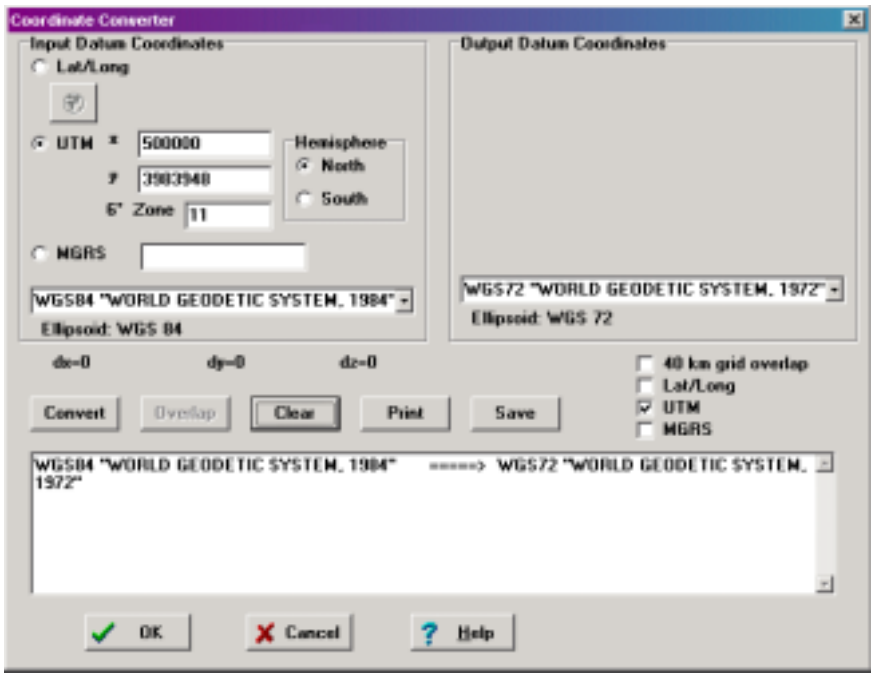
c. Enter the exact grid coordinates from your keyboard. Select OPTIONS / COORDINATES / VERIFY GRAPHIC SELECTIONS / "Reasonable" and Keyboard Entry rather than the default Graphical blowup as seen above.

Coordinate Conversion

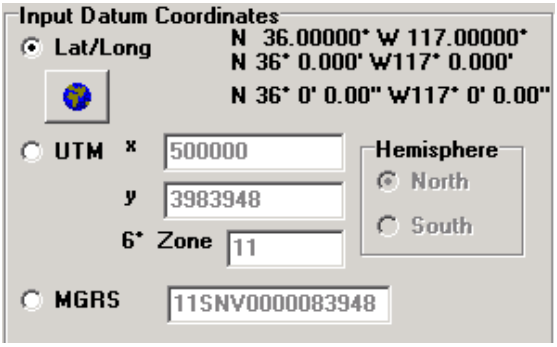
MicroDEM provides two ways to convert individual coordinates between coordinate systems (lat/long, UTM, MGRS), between datums (WGS-84, NAD27) or between both.

Select the <COORDINATE CONVERSION> button → 

This will bring up the Coordinate Converter window.



Here you may input the coordinate to be converted as Lat/Long, UTM or MGRS.



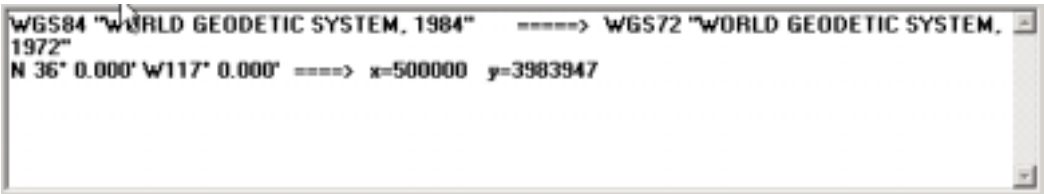
If you are entering the coordinate in Lat/Long click on the <Lat/Long> button → 
This will bring up the Input coordinates window.

You may convert from one datum to another or to the same datum by selecting the desired input and output datum from the left (input) and right (output) datum selection lists.

You may output the coordinate in 40km grid overlap, Lat/Long, UTM and/or MGRS by checking the boxes associated with the desired output format.

Once you have set both the input and output parameters and entered the input coordinate click on the <CONVERT> button → 

The output coordinate will be displayed in the selected format and datum in the output field.



GeoTrans

An alternate coordinate conversion module may be downloaded from the NIMA site: http://164.214.2.59/GandG/geotrans/geotrans.htm. Create a geotrans subdirectory in your MicroDEM directory and copy in Geotrans and its associated files. MicroDEM will then offer the <GEOTRANS> button at the lower right corner → 

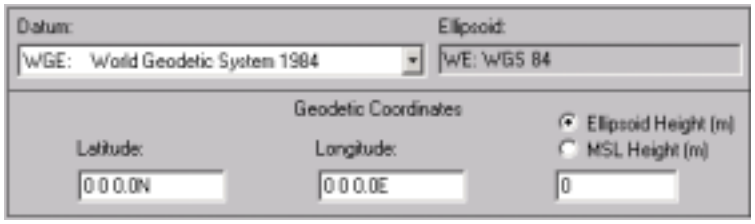
of it's coordinate conversion interface.

This will bring up the GEOTRANS2 – Geographic Translator V2 window.

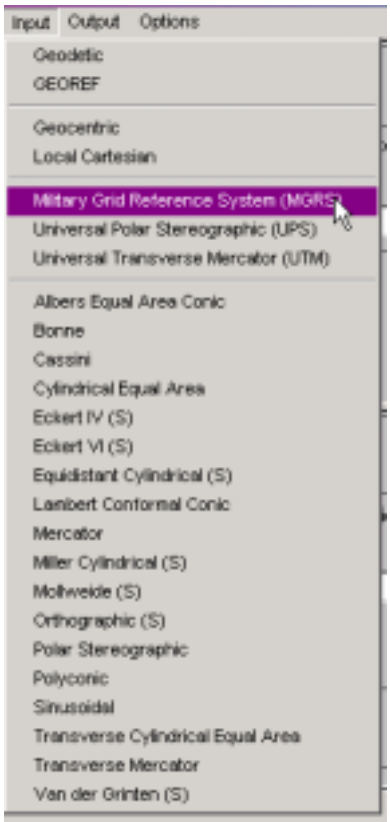
Of course GeoTrans may be run standalone by simply running it's executable.

Both coordinate conversion routines utilize the same NIMA algorithms to calculate the conversion of coordinates. See DMA publications TR 8350.2 and TM 8358.1.
GeoTrans is an Army certified module and has the advantage of additional formats and secondary datums. It is also able to batch process an ASCII list of coordinates.

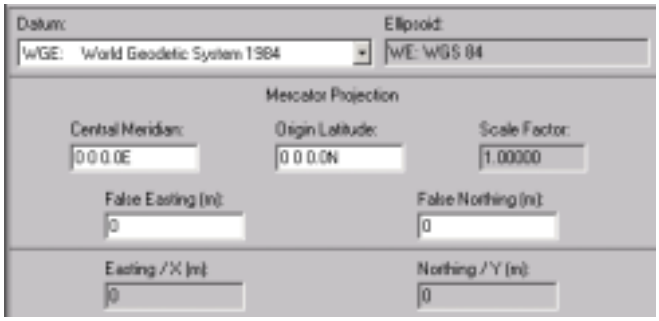
The interface is different but the same input/output parameters must be set in GeoTrans: input datum, output datum, input coordinate format and output coordinate format. Input parameters and data entry field are at the top of the window.



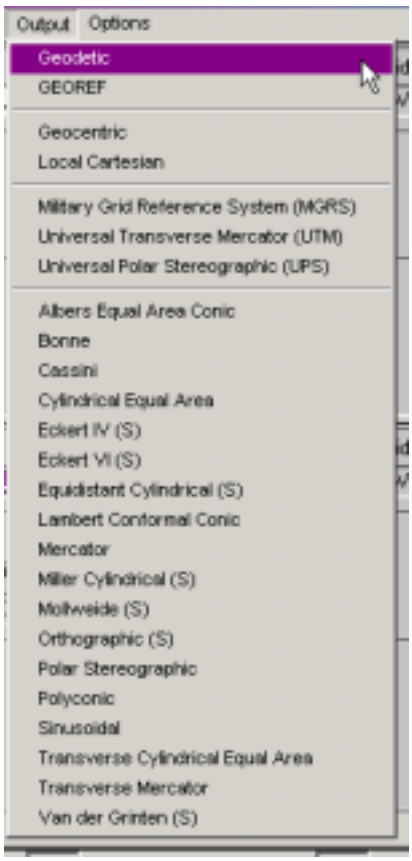
Input parameters may be changed by selecting INPUT from the menu. Selecting GEODETIC allows entry in Lat/long format and GEOREF allows entry in UTM/MGRS coordinate format.



Output parameters and data output fields are at the bottom of the interface.



Output parameters may be changed by selecting OUTPUT from the menu and then selecting the desired output format.

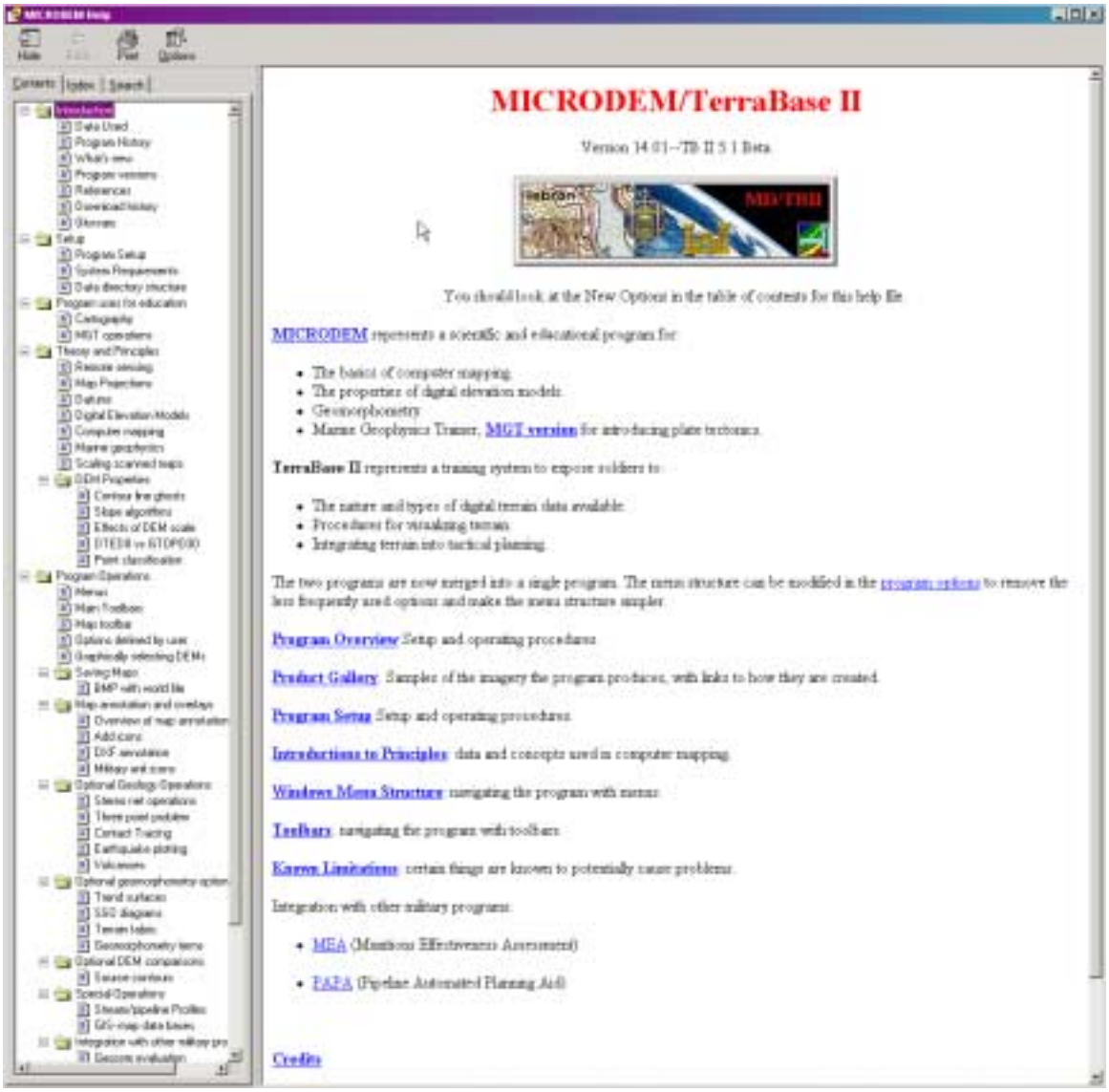


The complete GeoTrans User's Guide is available from the GeoTrans HELP. →

MicroDEM Help Files

MicroDEM has a **very** comprehensive Help File. Any questions you have concerning the operation of MicroDEM should first be researched here.

This Help file also offers an extensive set of educational sections on the theory and principles behind geographic information systems, terrain visualization and related sciences to include: Remote Sensing, Cartography, Map Projections, Datums, Elevation Models, Computer Mapping, Marine Geophysics, Geology, Micropaleontology and more.



It is well worth your time to peruse the MicroDEM Help file… who knows, you may learn something interesting that you weren't looking for.

Chapter 4 Tactical Applications

This chapter covers MicroDEM operations that are used for battlefield planning and other tactical applications. There are numerous combinations and uses for each product, you are limited only by your ingenuity and the data available.

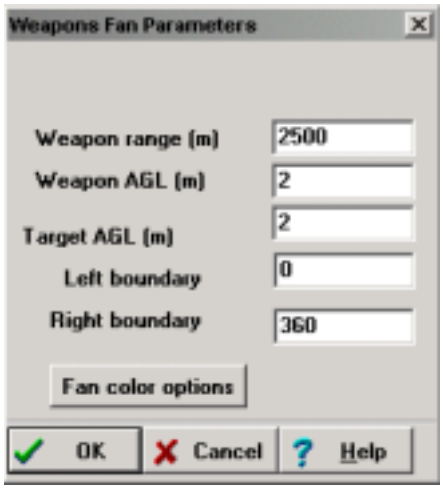
Weapons Fans
Line of Sight and Radio Line of Site
Slope/Cant Maps
Aspect Tinted Maps
Terrain Categories
Oblique Views
Perspective Views
Fly Through Movies
Panoramic View Movies
Circle Around View Movies
Route Observation 'Ambush' Movies
GPS Use with MicroDEM
Trouble Shooting GPS Cable Connections with Hyperterminal
Weather/Climatology
Solar and Lunar Light Data

Weapons Fans

This is an extremely useful and versatile tool for all branches/combat arms to identify enemy/friendly battle positions, template obstacle locations, determine ambush sites, etc. Weapons fans can be drawn over elevation data, imagery and maps, however you must have your elevation data loaded to create these overlays.

Select the <WEAPONS FAN> button → 

Double click on the display at the desired position for the weapons fan. This will bring up the Weapons Fan Parameters window.



Here you can change the radius or distance for the plot, the weapons elevation above ground level (AGL), the target elevation above ground level and the boundaries. Default settings will create a 360 degree weapons fan.

Clicking on the <Fan Color Options> button → 

will bring up the Fan Drawing Options window.

Here you can elect to create a MASKED area plot, a VISIBLE area plot or a combination MASKED&VISIBLE area plot.

Check the New IHS fans box to create these transparent fans calculated for all points within the fan range. The alternate/old style weapons fans produced only an opaque, masked area plot calculated along specific radials. RAY SPACING and POINT SPACING for the old style weapons fans may be altered by changing the values in their respective data entry fields.

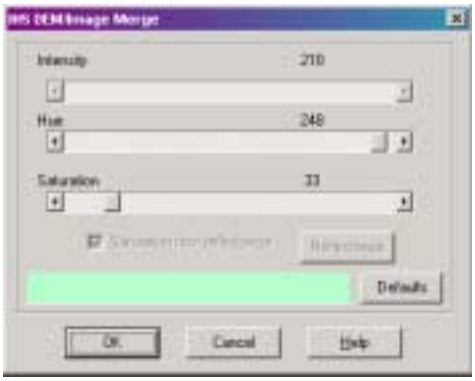
Check the Draw range circles box if you want your weapons fans drawn with range circles.

Click on the <0- Range circles> button → 

This will bring up the Select Range Circles (Meters) window where you can set the range or radius of up to five concentric range circles. See Chapter 3 page 43 for Range Circles.

Click on the <Fans IHS> button → 

This will bring up the IHS DEM/Image Merge window.



Here you can use the slider bars to control the color and transparency of your visible area weapons fans.

If you have elected to use the old-style weapons fans by NOT checking the New IHS Fans box,

click on the <Fans> button → 

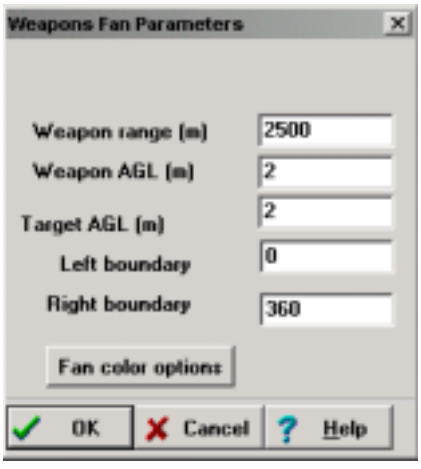
to select the opaque color for your visible area plot from the Color selection pop-up window.

Make sure you've checked the New IHS fans checkbox for now. Click on the <OK> button to close the Fan Drawing Options window. Click on the <OK> button to close the Weapons Fan Parameters window and draw the weapons fan.

This procedure must be repeated to draw another weapons fan.

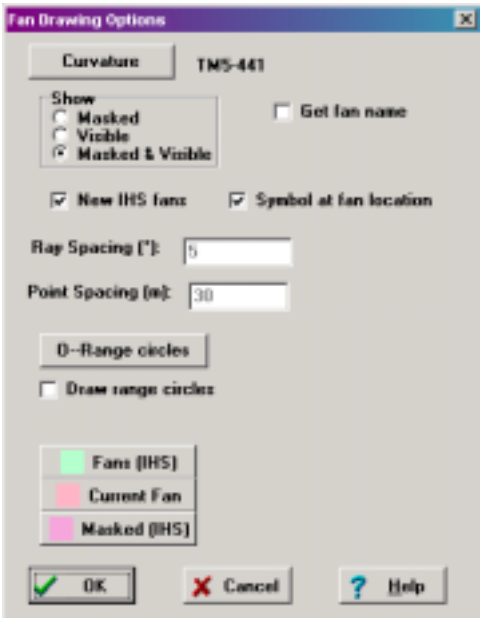
Select the <WEAPONS FAN> button → 

Double click on the display at the desired position for the weapons fan. This will bring up the Weapons Fan Parameters window.

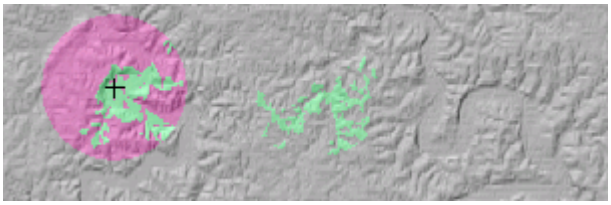


Clicking on the <Fan Color Options> button → 

will bring up the Fan Drawing Options window.



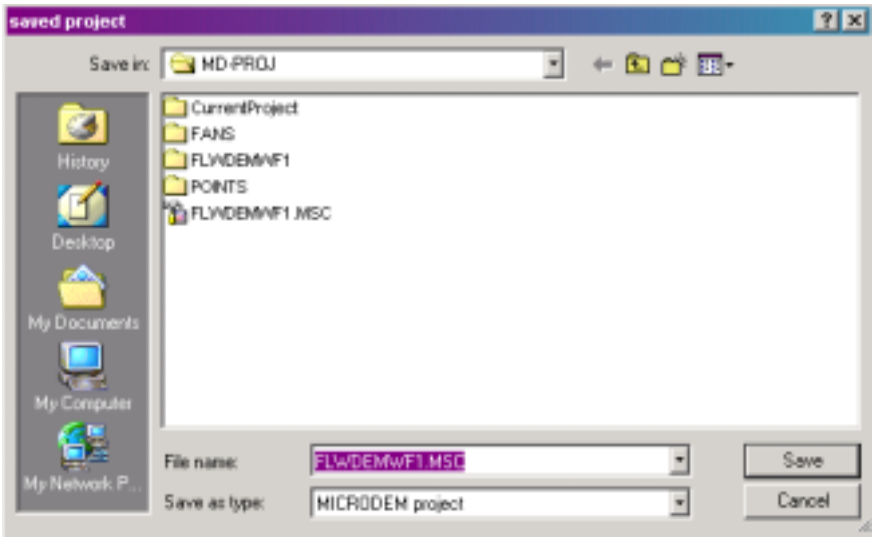
Select the Visible radio button under Show to create a VISIBLE AREA PLOT . Click on the <OK> button to close the Fan Drawing Options window. Click on the <OK> button to close the Weapons Fan Parameters window and draw the weapons fan.



Notice that the new weapons fan is drawn along with the original weapons fan. As each fan is created it is added to the FANS#.DBF database file. **NOTE:** The weapons fans database file is temporarily saved in your MicroDEM directory under the ..\MD-PROJ\Current Project\ subdirectories. These files will be deleted when you exit MicroDEM.

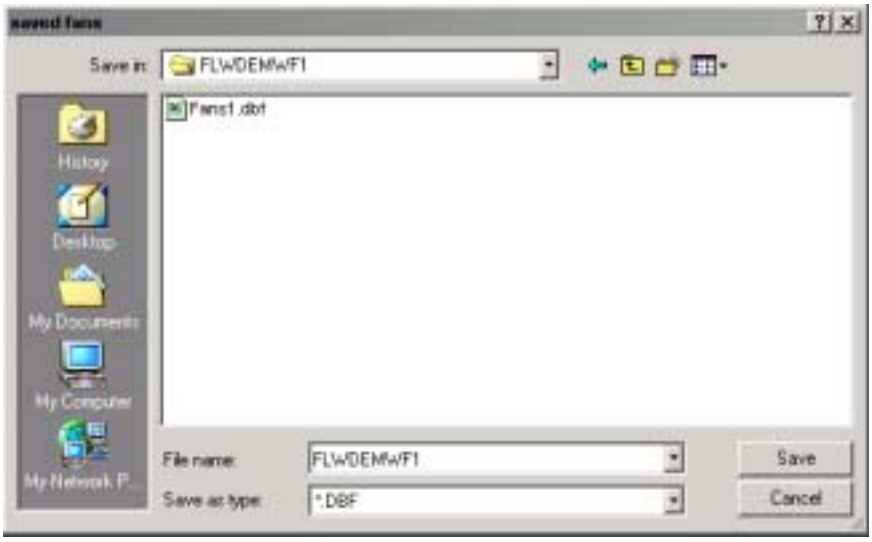
Saving Weapons Fans

Weapons fans may saved with your project map background by selecting WINDOW / SAVE PROJECT. This will bring up the Saved Project window.



Give your project a suitable name such as 'FLWRaster1' and your weapons fans will be saved as a .MSC file under the \MD-PROJ folder.

An alternate method of saving weapons fans is to select FILE/SAVE WEAPONS FANS at the main menu. The will bring up the Saved Project window.

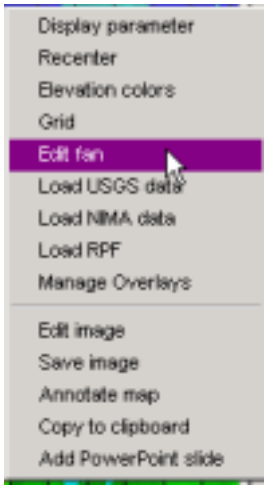


Type a name for a new subdirectory, which will be saved under the \MD-PROJ directory, the weapons fans will be saved as FANS1.DBF in this new folder.

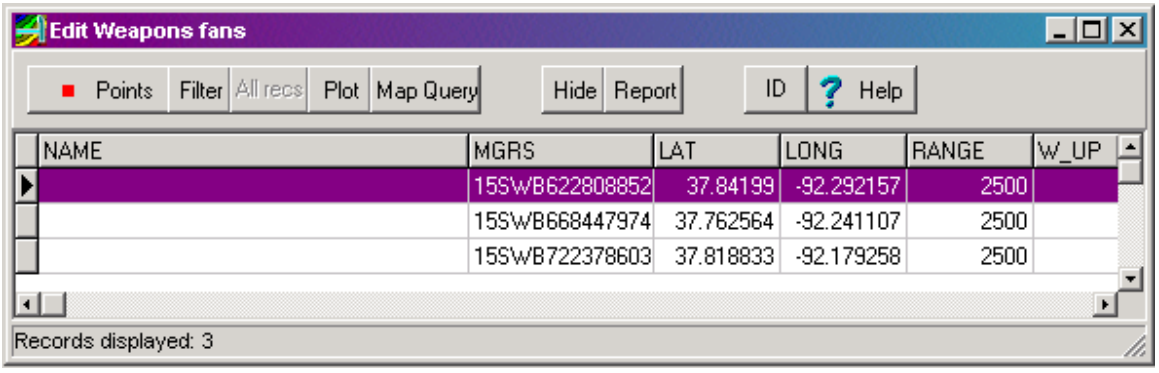
Editing Weapons Fans

Weapons fans may be edited by right clicking on your display and selecting Edit fan from the menu.

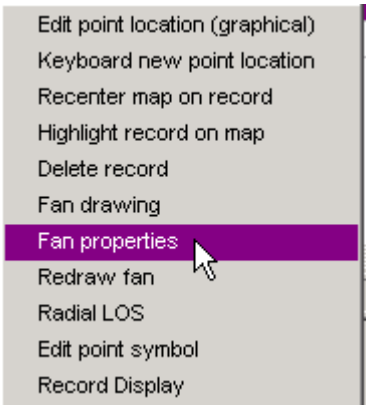
NOTE: You must have the Edit GIS data base box checked under the Database tab in OPTIONS in order to facilitate changes to your weapons fans overlay.



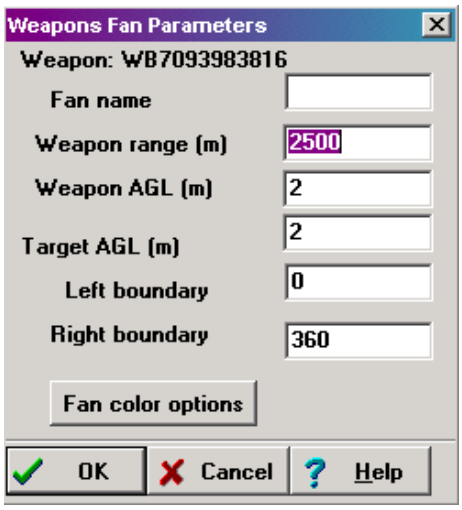
This will bring up the Edit Weapons Fans data base table for your current project.



Double click on the record for the weapons fan you need to alter. This will bring up the pop-up menu.

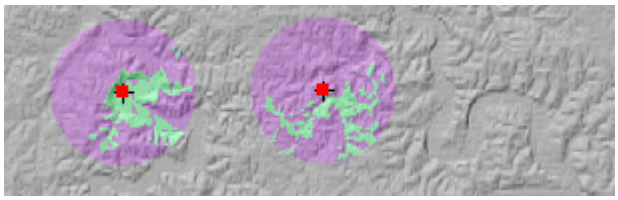


Select Fan properties from the menu. This will bring up the Weapons Fan Parameters window.



Here you will change any of the parameters for this specific weapons fan. When you have made the desired changes simply click on the <OK> button to close the parameter windows.

Click on the <FORCE REDRAW> button on your display →  to redraw your fan.



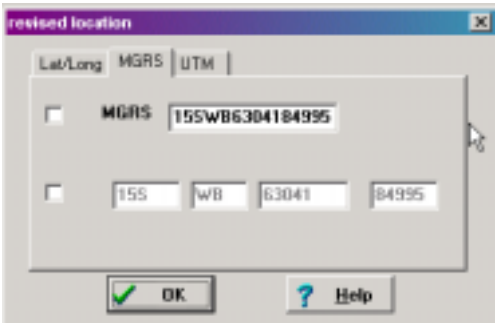
Here I have changed the second fan from a visible area plot to a combination visible and masked area plot.

Using this procedure you can also**:** Change the location of the weapons fan, Re-center your display over a selected weapons fan, Highlight the weapons fans associated with a selected record, Delete a record and its associated weapons fan from the database or Record Display.

The location of a fan may be changed either graphically or via keyboard entry of coordinates. Editing graphically is accomplished by simply double clicking on the new position for the weapons fan for the record you initially selected, by double-clicking, on the record from the database table.

Selecting Keyboard new point location will bring up the Revised location window.

.



Here you will enter the new location for the weapons fan for the record you initially selected, by double-clicking, on the record from the database table.

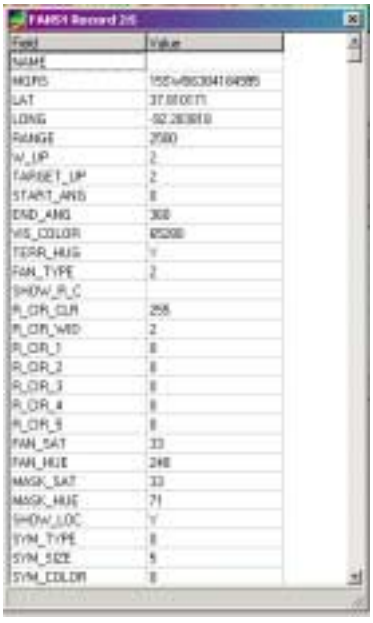
Use the <FORCE REDRAW> button → 

to redraw your display and show the new location for your edited weapons fan.

If you're not sure which record is associated with which weapons fan you can select Highlight record on map and a point symbol will be placed at the center of the weapons fan on your display.

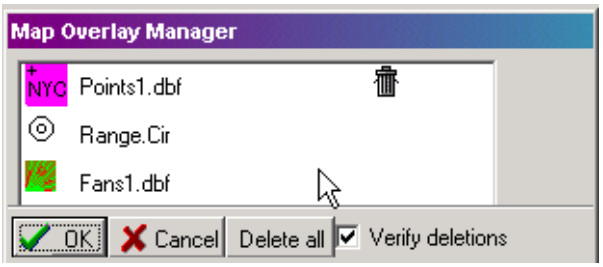
You may delete the record you double clicked on to bring up this pop-up menu by selecting Delete record. A Confirm delete record window will pop-up next, click on the <YES> button to delete the identified weapons fan.

Selecting Record Display from the list will bring up all the information in the database related to the selected weapons fan record as shown below.



Removing a Weapons Fan Overlay from the Display

Weapon's Fan Overlays are removed by selecting OVERLAY / OVERLAY MANAGER at the main menu. This will bring up the Map Overlay Manager window. **NOTE:** If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.



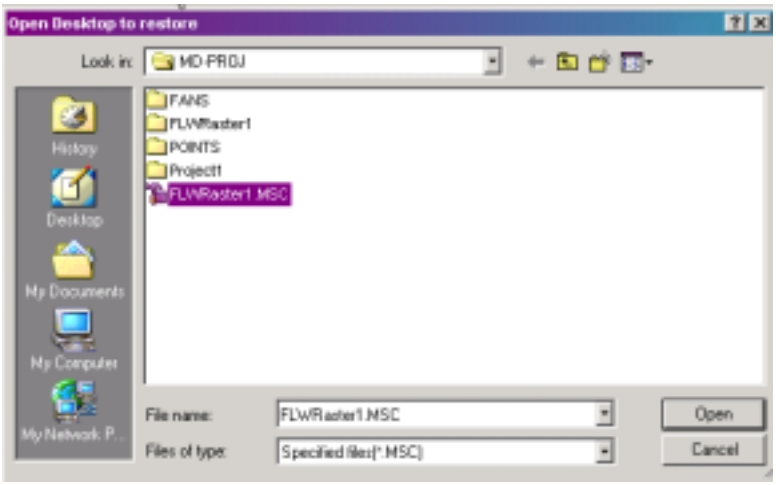
Here you can change the order of the overlays by clicking and dragging each overlay to a different point in the stack. Delete an individual overlay by dragging it to the trash can near the top right corner of the window. Delete all your overlays by selecting the <Delete All> button.

Redisplay of Weapon's Fan Overlays

There are three ways to redisplay your weapons fans.

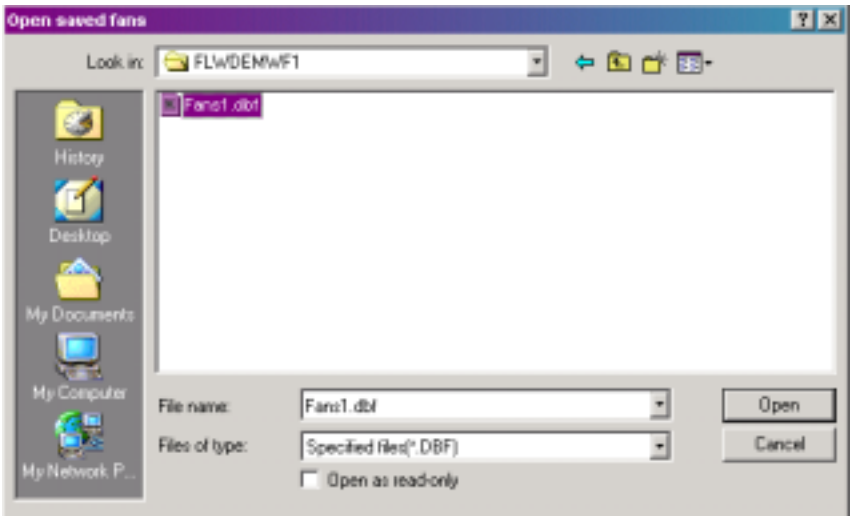
a. Restore Project with associated weapons fans.
b. Load Weapons Fans over your current display.
c. Plot from weapons fans from the database file.

a. Restore a project with its associated weapons fans by selecting WINDOW / RESTORE PROJECT from the main menu. This brings up the Open Desktop to restore window.



Select the desired project (.MSC) file and click on the <OPEN> button. The original project background maps will be displayed along with their associated weapons fans.

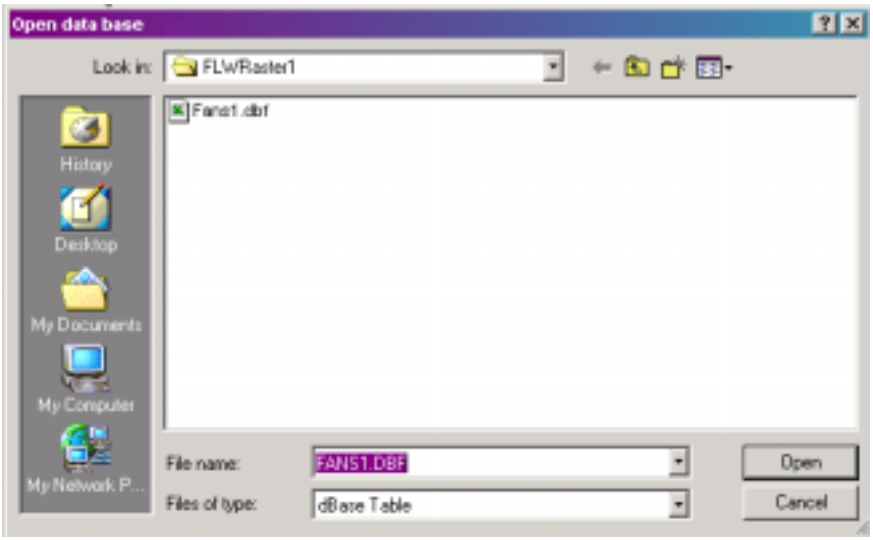
b. Select the elevation, image or map display you wish to use as a back ground map for your overlay. Load the weapons fan overlay over your current display by selecting FILE / LOAD WEAPONS FANS.



This will bring up the Open saved fans window. Navigate to the folder where you saved your weapons fans and select the desired (.DBF) weapons fan file. Once you've selected the desired file and clicked on the <OPEN> button the weapons fans will be displayed over your current display.

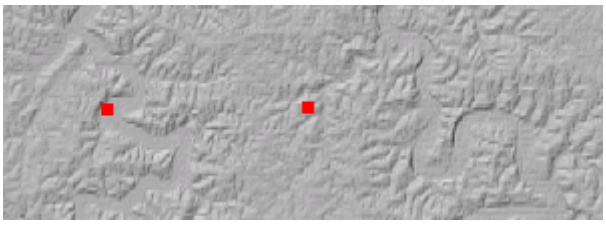
c. Click on the <Data base> button → DB

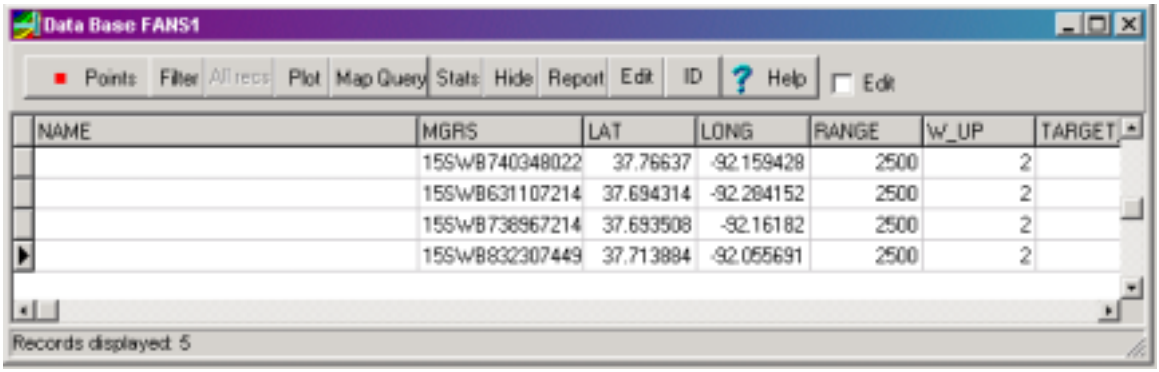
This will bring up the Open database window.



Navigate to ..\MicroDEM\MD-PROJ\ and the directory where you saved your fans and select the FANS1.dbf file.

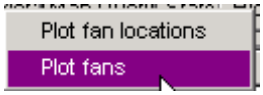
This will bring up the Edit Weapons fans database table and display the locations of your fans on your background map display.

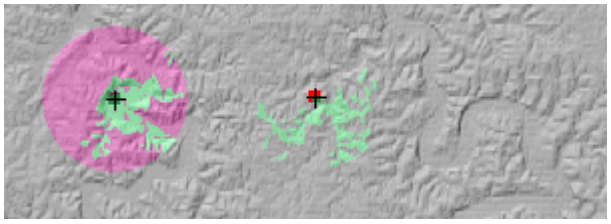




Click on the <Plot> button → 

this will bring up the Plot Weapons Fans menu.

Select the PLOT FANS option 



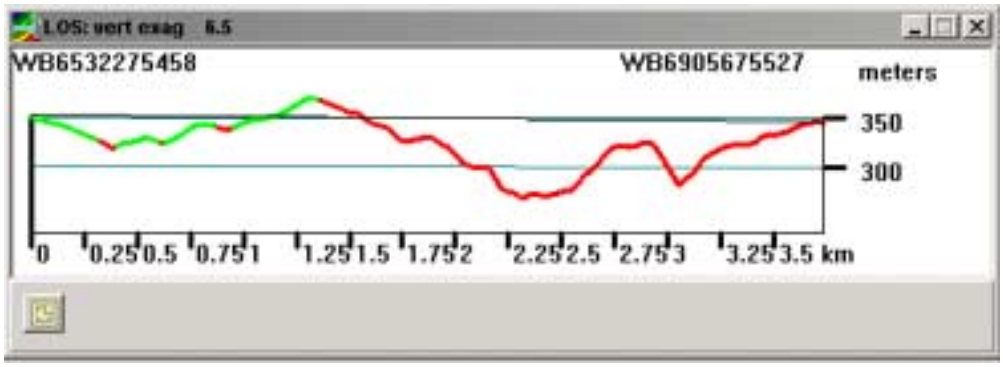
Your weapons fans will be redrawn over your background map.

Line of Sight (LOS) and Radio Line of Sight (RLOS)

This tool aids in determining if you have line-of-sight visibility between any two points on your display, however this does NOT take into account the vegetation in the area. The Radio LOS is useful in determining if you have FM communications between the two selected points at the selected frequency.

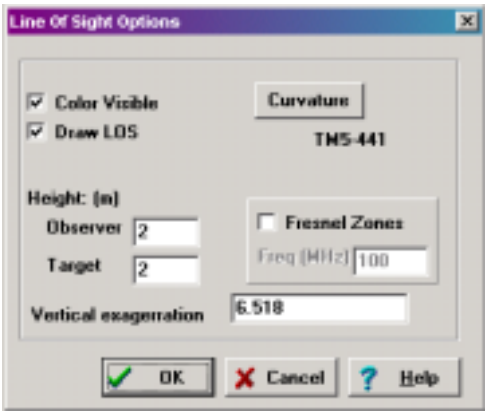
With your elevation file open, click on the <Line of Sight> button→ 

You may identify the endpoints for your LOS on the elevation display or on an associated image or map for the same area. Double click on the start point or observer and then double click on the end point or target. You'll note that a reverse video line is drawn between the start point and the current position of you mouse pointer. While moving the LOS to the target, the marginal data will tell you whether your target is masked or visible. Once you've selected your end point a graph will be displayed showing a cross section of the area. The observer's position is always on the left and the target position is always on the right. The coordinates of these positions are displayed in the current coordinate display format. Green is terrain visible from the observer position, while red is terrain not visible from the observer's position. Vertical and horizontal scales are created for the vertical/elevation and the horizontal/distance axes.



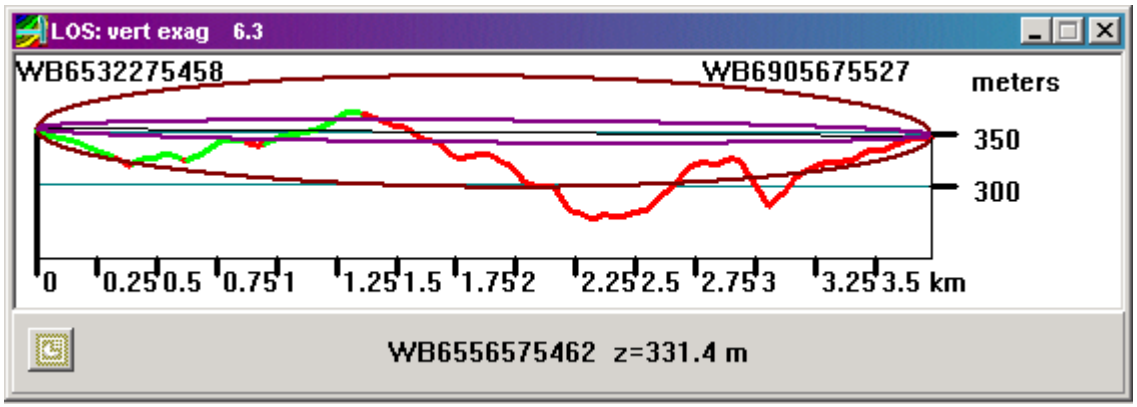
You may resize/rescale the graph by simply clicking on the border of the graph and dragging it to resize as you would any window. **NOTE:** If you move your mouse pointer along the LOS profile, you will get a grid coordinate and elevation reading for that point.

Right mouse click on the face of the graph to bring up the Line of Sight Options window.



Here you can alter the default elevation height for the observer and target by changing the values in the Height: (m) Observer and Target data entry fields.

Checking the Fresnel Zones box will allow you to create a Radio Line of Sight or RLOS at the frequency specified in the Freq(Mhz) data entry field. Once you made the specified changes simply click on the <OK> button to generate the new RLOS graph.



MicroDEM 's Help file contains the following information about RLOS options.

Computation of Fresnel zones for radio line of sight requires two parameters:

- **frequency** in Mhz. This affects the size of the Fresnel zones.
- **k factor**, or effective earth radius multiple. A standard radio atmosphere (standard refraction) has a k factor of 1.333; this value can be used for gross planning of radiolink systems. The value of k will vary with altitude, time of day, the season, weather conditions, latitude, and proximity to the coast. Values for various conditions have been tabulated; often the tabulations give delta N, the mean refractivity gradient in the first km of the atmosphere. If k > 1, the wave refracts toward the earth; if k < 1, the wave refracts upward toward space. Worst case k values will be about 0.4; k=1.33 represents the ideal case. K affects the amount of curvature on the profile.

Interpretation of the Fresnel zones:

- Radio line of sight requires no intrusions into the first Fresnel zone within the first and last1 km next to the receiving and transmitting antennas.
- Want no intrusions more than 40% into the first Fresnel zone at any point. (optimal clearance requires 60% of the first Fresnel zone).
- At least grazing line of sight must exist during adverse refraction (when k =1 or k= 0.667).

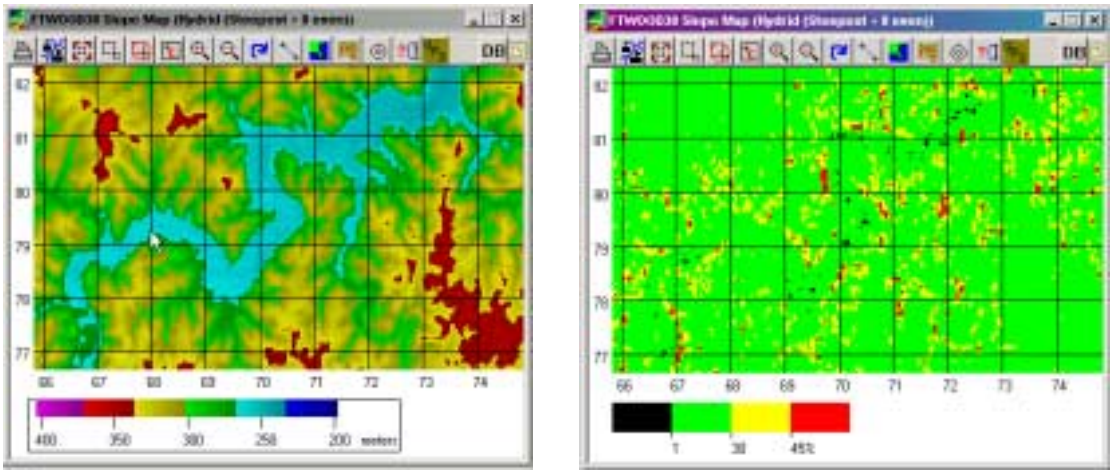
The Fresnel ellipsoid is defined as the loci of all points for which of the sum of the distances from the two antennas is greater by half a wavelength than the direct distance.

The first Fresnel zone is shown in maroon on the profile. The inner 20% of the first Fresnel zone is shown in purple, and must be free from all obstructions.

Slope Maps

This tool is helpful for the development of MCOO & CCM overlays, selection of base-camp sites and LZ/DZ'S. Parts of this information are provided in Chapter 2 on Modifying Display Parameter of Elevation Data.

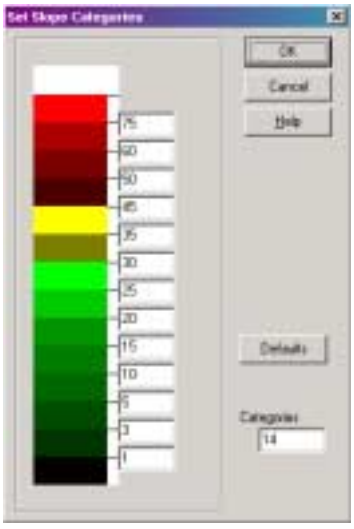
Mobility analysis plots are called slope plots. Artillery analysis plots are referred to as cant plots.



Elevation data, displayed on the left as an Elevation Tint, is redisplayed on the right as a Slope/Cant Plot. The Slope/Cant display's legend represents the four slope categories, <1%, 1-30%, 30-45% and >45% of the NATO mobility model. This is often called a Trafficability plot and is used in assessing cross-country mobility.

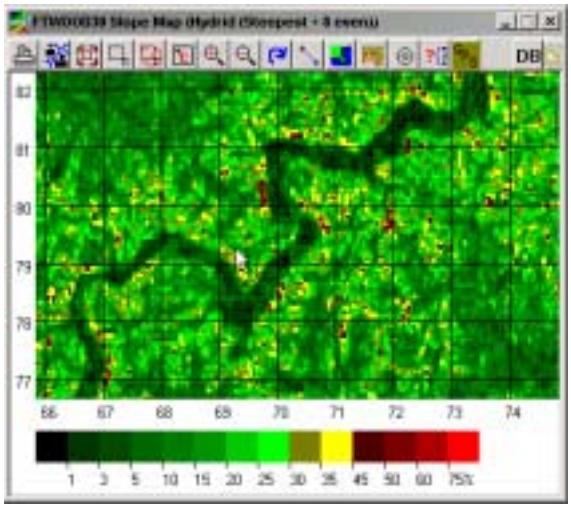
Right click on the display and select Standard from the five available slope plot options on the pop-up menu. This will allow you to customize your slope plot by setting slope ranges and colors for fourteen different categories.

The Set Slope Categories pop-up window will allow you to edit the number of categories, the range for each category and the associated color. Accept the given display for now and click the <OK> button. The display is now broken down into more categories and the new legend can be found at the bottom of the window.



Once you have redefined your slope categories click on the <OK> button to redisplay your data.

The following map shows the same elevation data from page 63 redefined using the default Standard slope plot. Notice the expanded range of the slope categories in the legend.

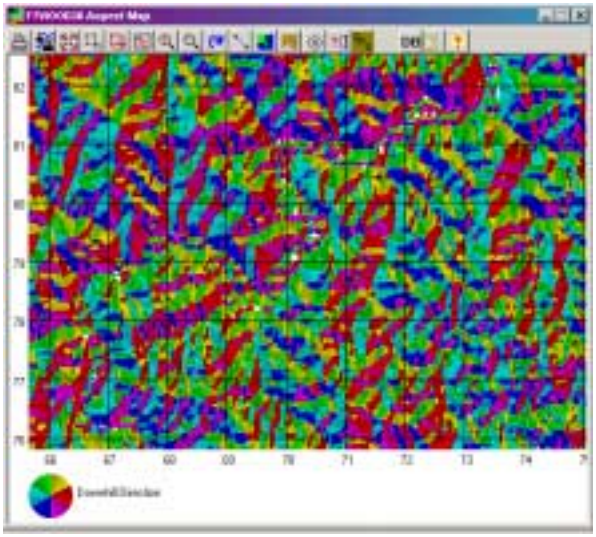


Aspect Tinted Maps

The ASPECT map is another useful display of elevation data. This plot is broken down into six colors showing the direction of slope, which can aid you in determining IV lines (intervisibility lines).

At the main menu select VIEW / TINTED MAPS. This will bring up the Tinted Maps pop-up menu.

Select Aspect from the list. This will generate a new display of your elevation data. The following map shows the same elevation data from page 63 plotted as an aspect map.

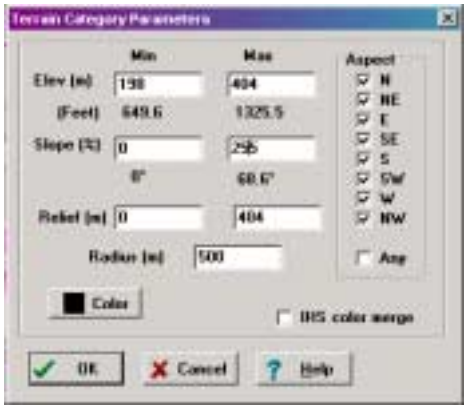


The legend at the bottom of the display shows a compass rose broken into 45 degree segments with the slope direction indicated by color.

Terrain Categories

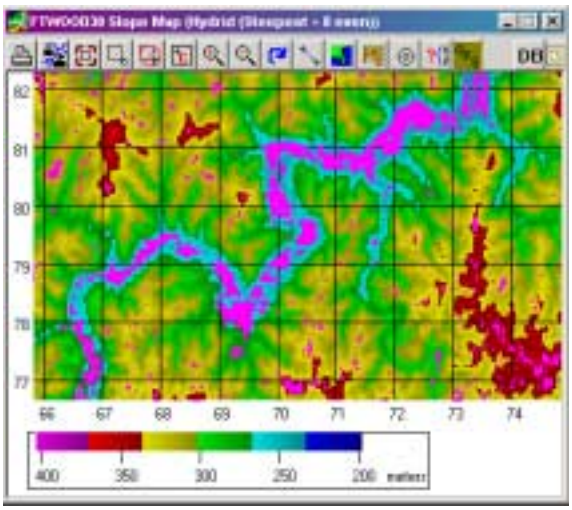
This tool is useful to highlight specific types of terrain based on relief, such as base camp sites, LZ/DZ'S, artillery cant, POL/water sites, etc...

At the main menu select OVERLAY / TERRAIN CATEGORIES. This will bring up the Terrain Category Parameters window.

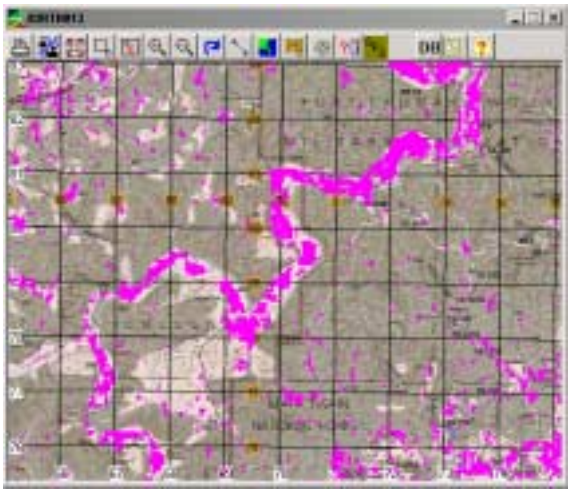


Here you can define the parameters of your mask overlay based on elevation, slope, relief, aspect and radius. The range for each factor will include the full range for your data set so all you need to do is to narrow one or more of the parameters to define your mask.

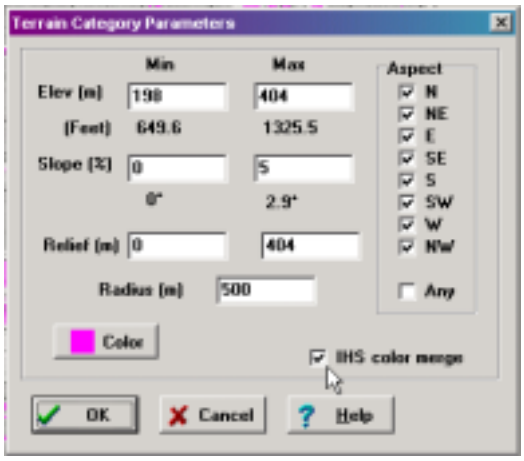
For example, if we were looking for possible base camp sites throughout the entire elevation map, we would define those characteristics desirable for base camps**:** a slope of 0-5% and minimum radius of 300 meters.



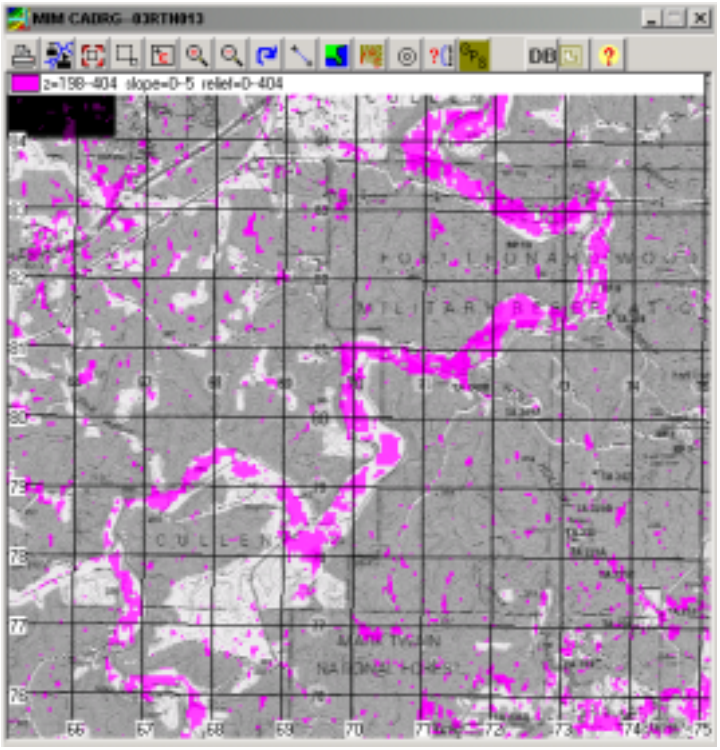
The purple mask overlay highlights those areas meeting our requirements. Remember that you must have your elevation data displayed in order to perform this analysis; however, as with any other analysis, you can actually plot the terrain category mask over any imagery or map of the same area as below.



Transparent IHS Terrain Category overlays may be generated by checking the IHS box [] in the Terrain Category Parameters windows.



The map background is gray-scaled and a transparent mask is applied.



The IHS Terrain Categories Overlay allows you to view text and features behind the mask.

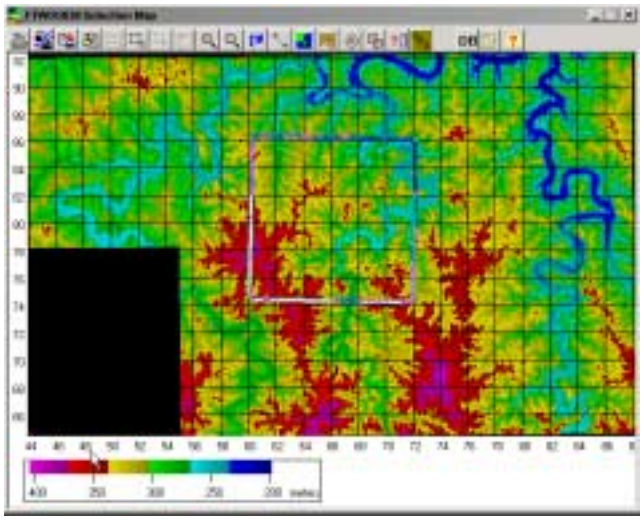
Terrain Category Overlays may be removed by selecting OVERLAY and OVERLAY MANAGEMENT at the main menu.

Oblique Views

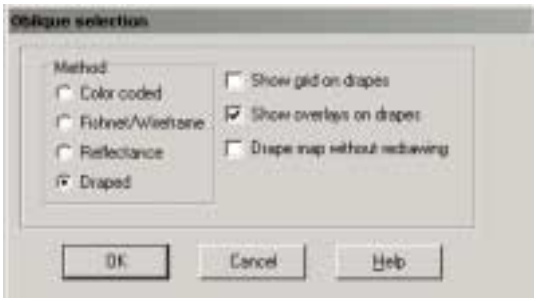
This tool aids in viewing battle positions, avenues of approach, mobility corridors, engagement areas, etc...

With your elevation data open, click on the <Oblique View> button → 

Double click on the left front corner of the area for the oblique then move the mouse pointer to the right front corner and double click Notice that a reverse-video box is drawn which defines the area of your selected oblique view.

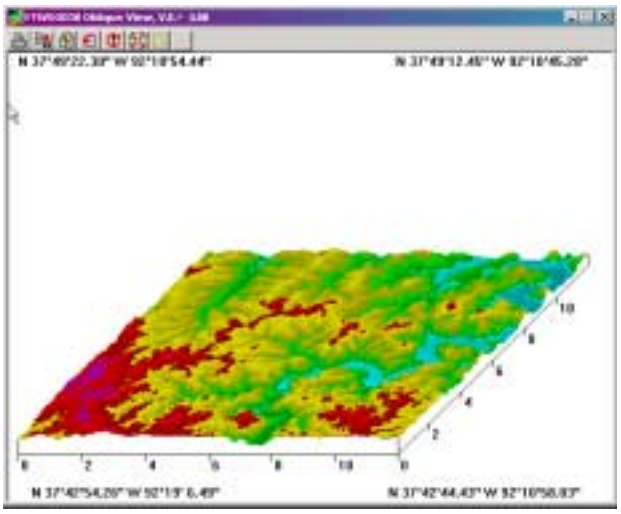


Once you have identified the area for your oblique view the Oblique selection window will appear.



Here you will select the type of oblique view you need. Select Draped and click the <OK> button.

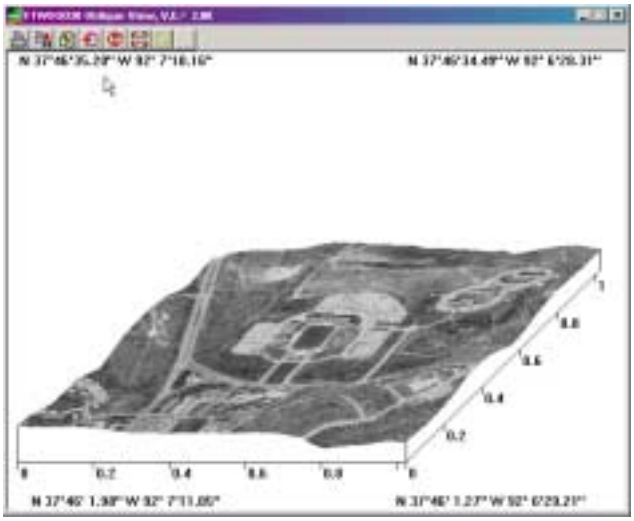
Overlays such as: weapons fans, UTM grids and symbology may be draped by checking the Show overlays on drapes box.



To modify the oblique view right click anywhere in the oblique display. This will bring up the Oblique Options window.

Here you can change the vertical exaggeration, rotate the view in 90 degree increments, change the type of oblique view and change the size of the view. Click on the <OK> button and the view will be redrawn.

To create the oblique view with imagery or map files draped on top simply have both your elevation data and your image or map open. Identify the front corners of your oblique view by double clicking on the image or map display.

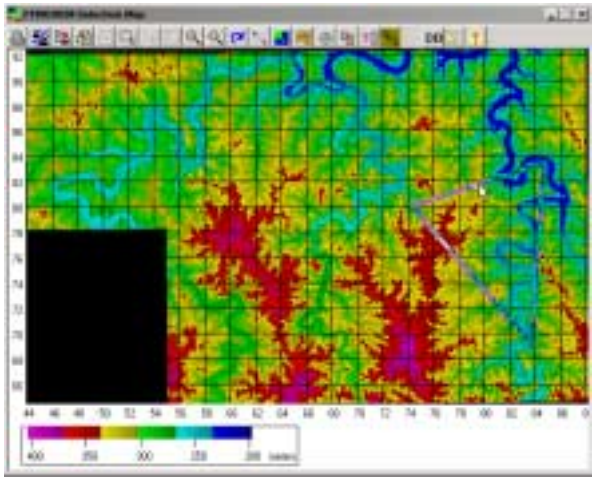


NOTE: To clean the reverse-video area selection box created on your map display simply click on the <FORCE REDRAW> button → 

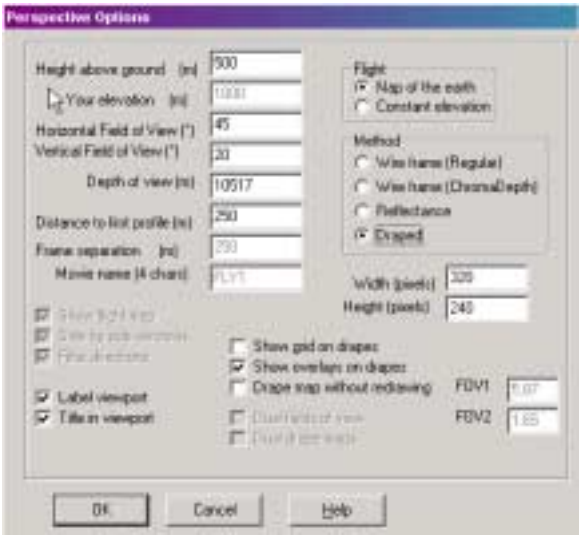
Perspective Views

This tool can provide a view from the foxhole, battle position, helicopter, avenue of approach, and can aid in terrain association.

With your elevation data open click on the <PERSPECTIVE VIEW> button→ 



Select the observer's position for your perspective view by double clicking on display with the mouse. As you move your mouse to the end of your field of view you will notice a reverse-video triangle which delineates the area visible in your perspective view. Double click on the end of your field of view to bring up the Perspective Options window.

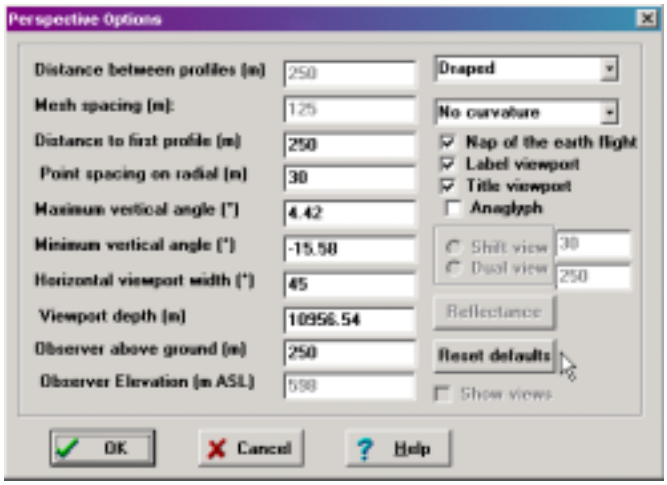


Here you should enter the observer's height above the ground or the observer's elevation above sea level. Selecting Nap of the earth will use the observer's height above the ground. Selecting

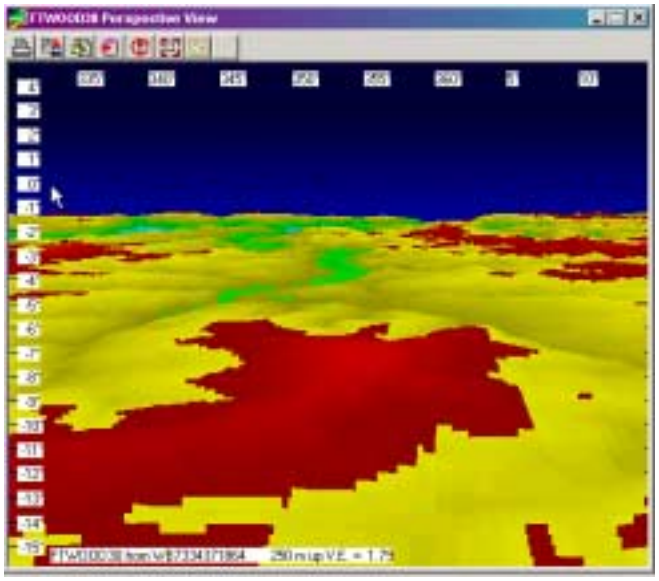
Constant elevation will use the observer's elevation above sea level. Normally you would select Draped under the Method section. The Width (pixels) and Height (pixels) data entry fields will determine the original size of the perspective view. Don't worry about any of the other settings for now. You can experiment with other settings at your leisure.

NOTE: The Perspective View may be enlarged or reduced in size by simply clicking on the border of the display and dragging to resize the display as you would any other window.

If the perspective view doesn't look right you can right click on the display to bring up the second Perspective Options window.



Here you can change a variety of parameters for the view but the most common adjustment will be the Maximum vertical angle (*) and the Minimum vertical angle (*). These two data entry fields represent the position of the top of your perspective view display and the bottom of the perspective view display and correspond with the vertical scale running up the left side of the display which is marked in degrees from the horizontal.

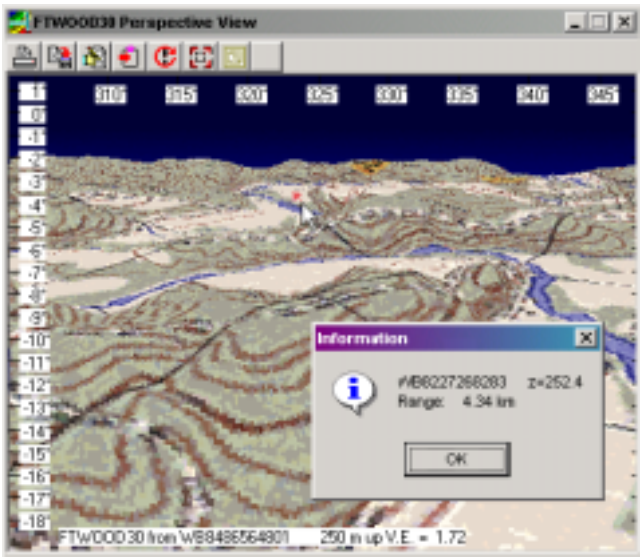


Note the position of the mouse pointer at ZERO or horizontal.

Also note that the compass bearing is listed across the top of the perspective view. The data set you're using is listed at the bottom of the display along with the observer's position, observer's elevation and the vertical exaggeration of the view.

Vertical exaggeration is controlled by the difference in the Maximum vertical angle and the Minimum vertical angle. The down-look angle will need to be adjusted, by dropping both of these values, if you have your observer at any great height.

One interesting feature of the perspective view is the ability to double click on any given target position in the view and get a report on the coordinate for the target, the target's elevation and the target's distance from the observer.



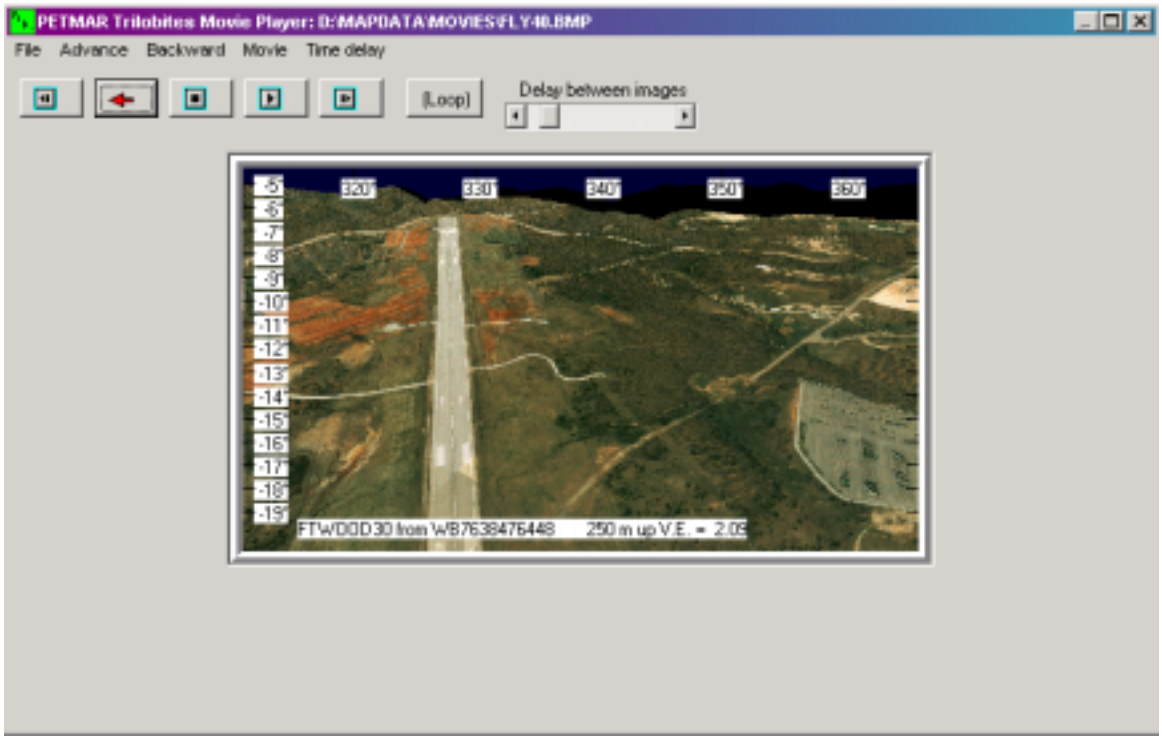
To create the perspective view with imagery or map files draped on top simply have both your elevation data and your image or map open. Identify the observer's position and the end point of your field of view by double clicking on the image or map display.

NOTE: To clean the reverse-video field of view triangle created on your map display simply

click on the <FORCE REDRAW> button →

Fly Through Movies

This tool allows you to drive down avenues of approach or fly along a particular route to gain a better understanding of the surrounding terrain. Fly through movies may be created over elevation-data, imagery or maps but you must always have the elevation data loaded for the area. To create the fly through with imagery or map files draped on top simply have both your elevation data and your image or map open. Identify the observer's position and the end point of your field of view by double clicking on the image or map display instead of over the elevation data display.

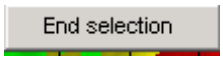


This tool uses techniques similar to those outlined in the previous section on the Perspective View. Each movie is actually made up of several files: an .FLT file which defines the route, a .MOV file which is an ASCII list of the frame files making up the movie and the individual .BMP, GeoTiff or .JPG frame files which are numbered sequentially.

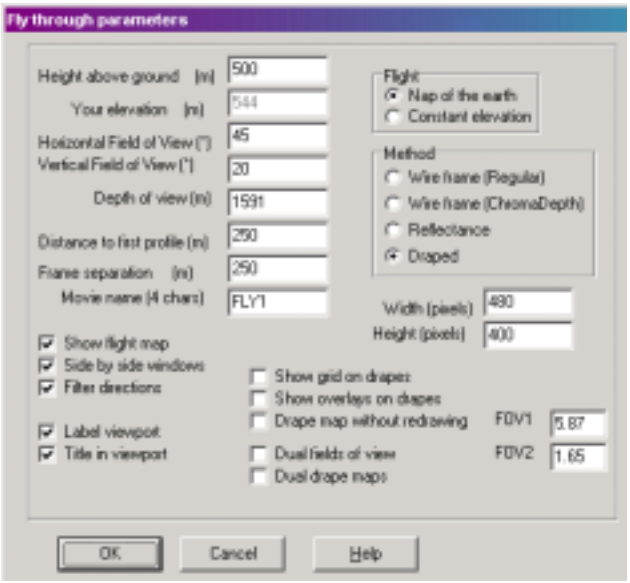
Once created, the movie may be replayed using MicroDEM's built in PETMAR Trilobite movie player (shown above), or it may be converted to other standard formats such as a Microsoft Audio-Video Interleave (.AVI), an Animated Gif (.GIF) or an Mpeg (.MPG) movie. These alternate file formats may be utilized with other software such as the Microsoft Multimedia Player and Power Point.

Click on the <FLYTHROUGH> button → 

Double click on the display to identify the starting point for the route for the fly through. Move your mouse pointer to the next point along the route and double click again. Continue this procedure until you reach the end of your planned flight route then right mouse click to bring up the small End selection menu.

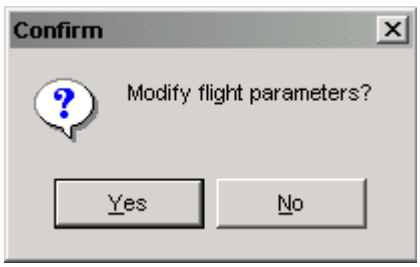
Left click on the End selection menu → 

This will bring up the Fly through parameters window.

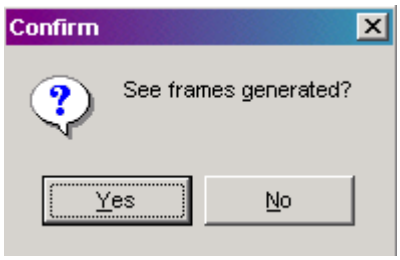


Here you should enter the observer's height above the ground or the observer's elevation above sea level. Selecting Nap of the earth will use the observer's height above the ground and will produce a terrain-following fly through. Selecting Constant elevation will use the observer's elevation above sea level and will produce a level-flight fly through. The default setting for Distance between profiles is 250 meters, shorter separation will make your movie run smoother but will significantly increase its storage size. Normally you would select Draped under the Method section, this will lay your image or map over the elevation data. The Width (pixels) and Height (pixels) data entry fields will determine the original size of the perspective view. Movies are given a default 4 character name starting with FLY1 and incremented thereafter to FLY2, FLY3 etc. Type a new four character name in the Movie name (4 chars) data entry field if you want a more descriptive movie name. **BE WARNED:** Movies take up huge amounts of hard drive space. You should copy any movies you wish to keep to back-up media and remove them from your hard drive. Delete all unneeded movies as soon as possible. Selecting JPEG for the movie format will also conserve disk space.

Don't worry about any of the other settings for now. You can experiment with other settings at your leisure. Click on the <OK> button to begin generation of the individual frames for the movie. Remember that if you have identified a long route, are using high-resolution imagery or have a slow computer, generation of all your frames will take some time. Each frame of the movie will be displayed as it is generated. To change any of the parameters during movie generation simply click on the <Abort processing > button on the Drawing Perspective n/n pop-up window. This will bring up the Confirm Modify Flight Parameters pop-up window. To modify flight parameters click the <YES> button. To see the movie as generated up to this point click on <NO>.

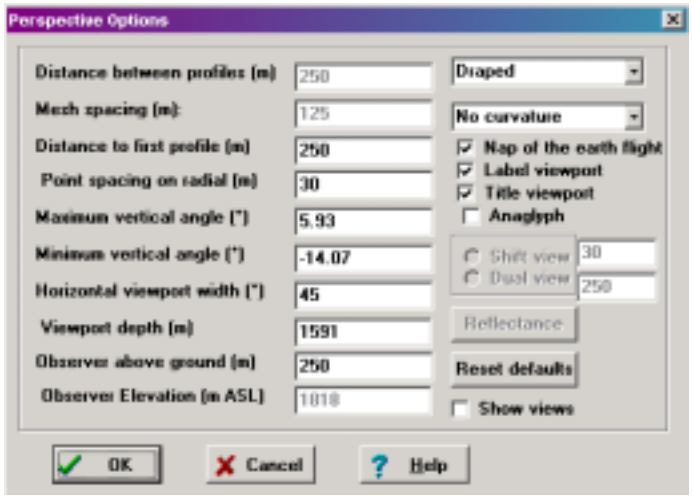


Clicking <NO> will bring up the Confirm - See frames generated window.



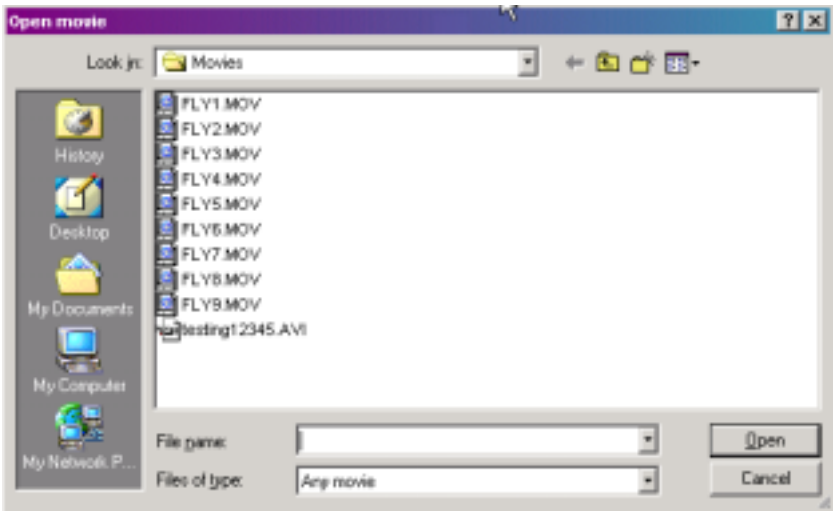
Click on the <YES> button to display the movie up to the point that you interrupted its generation. Click on the <NO> button to terminate the entire movie creation process.

Clicking <YES> on the Modify flight parameters window will bring up the Perspective Options window.



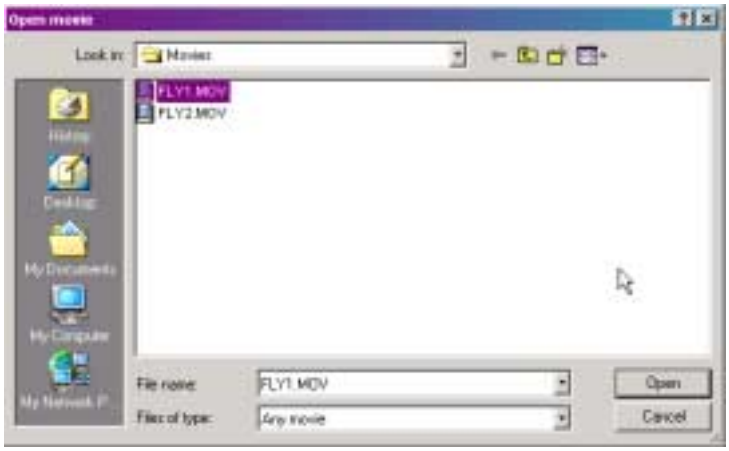
Here you can change a variety of parameters for the view. Again, the most common adjustment will be the Maximum vertical angle (*) and the Minimum vertical angle (*). These two data entry fields represent the position of the top of your perspective view display and the bottom of the perspective view display and correspond with the vertical scale running up the left side of the display marked in degrees from the horizontal.

Again, click on the <OK> button to begin generating the movie from scratch. This will bring up a Drawing Perspective n/n progress bar showing the progress of movie frame generation. When the movie creation process has completed the Open movie window will appear.



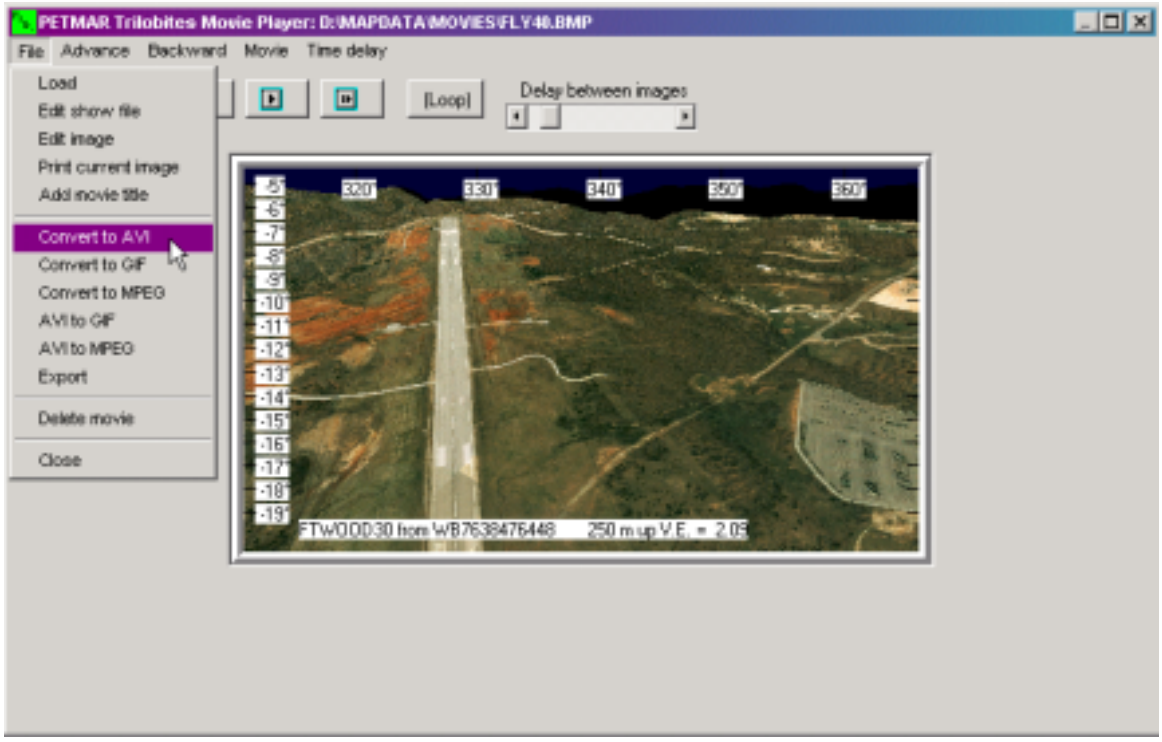
Here you may select the movie you just created or you may display any of the previous movies you created. The movie will be displayed in MicroDEM's built in PETMAR Trilobite movie player.

To convert your MicroDEM movie into another, industry standard, movie format select FILE/TOOLS/MOVIE REPLAY to bring up the PETMAR Trilobite movie player.
You will first get the Open movie pop-up window where you will identify which movie you wish to play.

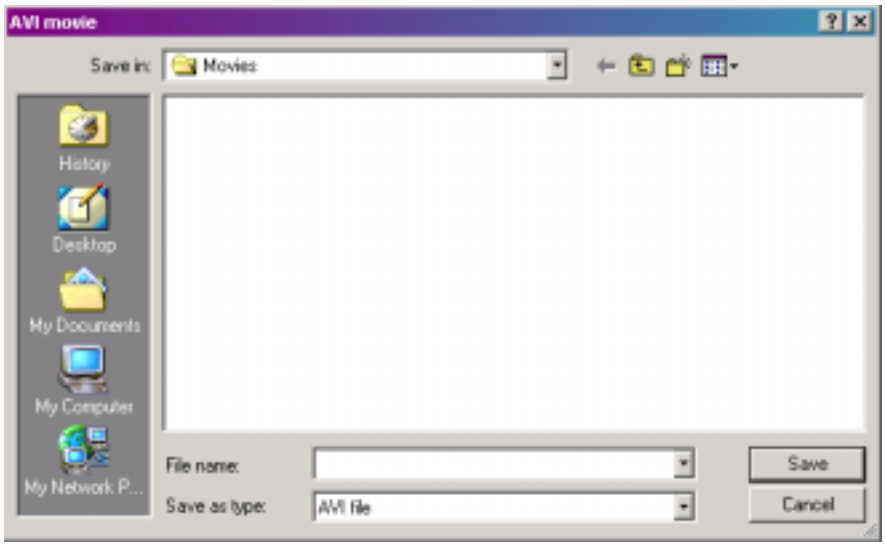


Next or if you are already running a movie in the PETMAR Trilobite movie player.

At the PETMAR Trilobites Movie Player main menu select FILE/CONVERT TO AVI.

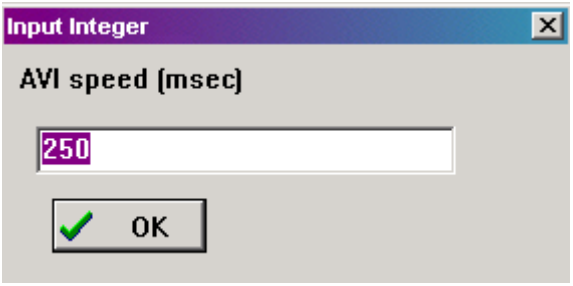


This will bring up the AVI movie name pop-up window.



Enter the name you wish to give your AVI movie.

This will bring up the Input Integer – AVI speed (msec) pop up window.



This is the default time delay between each frame in your movie in milliseconds. You can experiment with this value but for now simply click on the <OK> button to accept the default value.

The MicroDEM **HELP** file lists the following information on Movie Conversion**:**
There are three options for exporting a movie. The recommended solution is to use the animated GIF option. It produces compression and the most universal success.

1. **File, Convert to AVI:**
A title sequence will be added to the start of the movie.
All images will be stretched to that of the first image
The AVI will have no compression.

2. **File, Convert to MPEG:** this will convert the movie to AVI format and then convert the AVI to MPEG. The MPEG conversion uses the freeware command line program avi2mpg1 version 1.5 (1997) by John Schlichther. This file must be in the utils subdirectory on the hard disk, as a subdirectory of the directory from which you are running the program. The MPEG will have an M1V extension, and may not be universally compatible with all viewers. This conversion sometimes fails for unknown reasons.

3. **File, Convert to GIF**: this will be compressed a reasonable degree. It will work in web browers (both IE and Netscape), but some graphics programs will not display the animation but only the first frame.

4. **File, Export**: You can export the MOVIE into a format for conversion to MPEG or AVI standards, which will do the following:
Give you the option of putting the file name in the upper left corner of the screen, for instance to keep the date with the image if the files are named that way.
Convert all images in the sequence to the size of the first one. The converters I have seen do not accept different sized images. This will be done by stretching or shrinking.
Name the files in sequential order for automatic import in the outside converter.
Allow inserting each BMP multiple times to slow down the movie.
This copies all the BMPs, and requires appropriate disk space.
Some animations, such as the fly throughs produced by MICRODEM/Terra Base II, should already be in the correct format and should not require this export step.

NOTE: Try to remember the file name of each fly through you create and delete any fly through files you do not need to avoid eating up precious hard drive space.

Movies may be deleted using the Windows Explorer by navigating to the ..\Mapdata\Movies directory and deleting the .flt, .mov, and .bmp/.jpg files with your 4 character file name prefix. Movies may also be deleted by selecting FILE/DELETE MOVIE option in the Movie player, or by selecting FILE/DATA MANIPULATION/DELETE/MOVIE option from the MicroDEM main menu.

Remember: Creating fly through movies is an art, not a science. Have patience, get the hang of how the movies are created and how different data types are displayed. Be creative and have fun, your efforts will be rewarded.

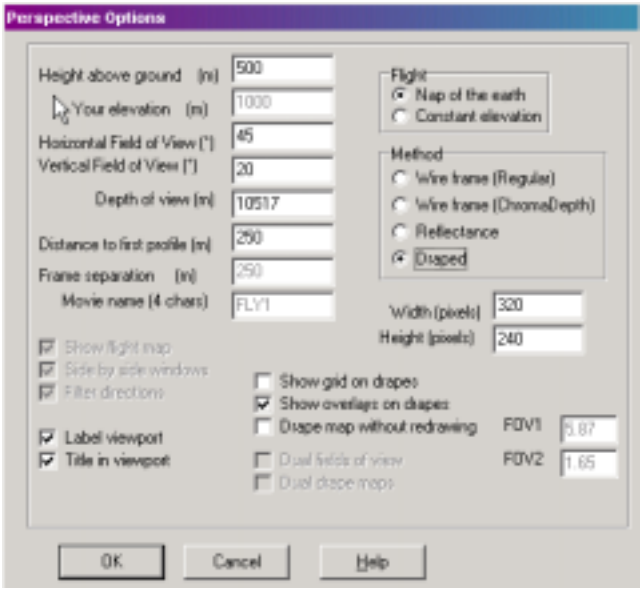
Panoramic View Movies

This tool allows you to generate a movie that shows the view as you stand at one location and spin clockwise or counter clockwise up to 360 degrees at any desired increment. This can be especially helpful in examining battle/LP-OP/surveillance positions and for terrain association. The tool will create a series of movie files similar to that of the fly through.

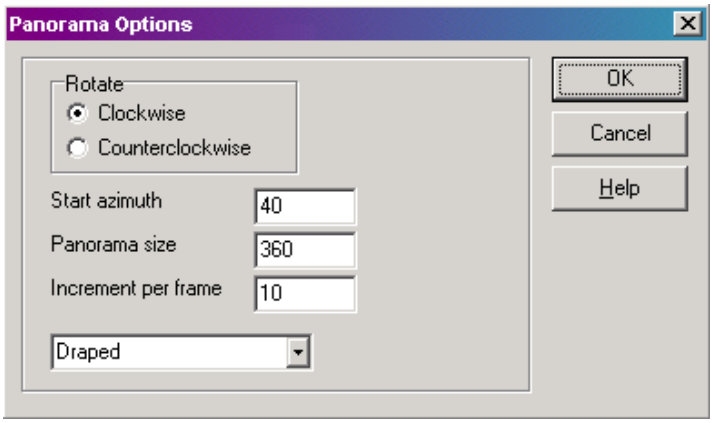
Panoramic movies may be created over elevation-data, imagery or maps but you must always have the elevation data loaded for the area. To create the movie with imagery or map files draped on top simply have both your elevation data and your image or map open. Identify the observer's position and the end point of your field of view by double clicking on the image or map display instead of over the elevation data display.

At the MicroDEM main menu select VIEW / PANORAMA. Double click on the center point for the Panoramic view. Move your mouse point to any point along the radius of your planned view-circle and double again. Notice as you move your mouse pointer you will drag the perspective triangle out to indicate the initial direction and distance of view you desire

This will bring up the Panorama Options window.

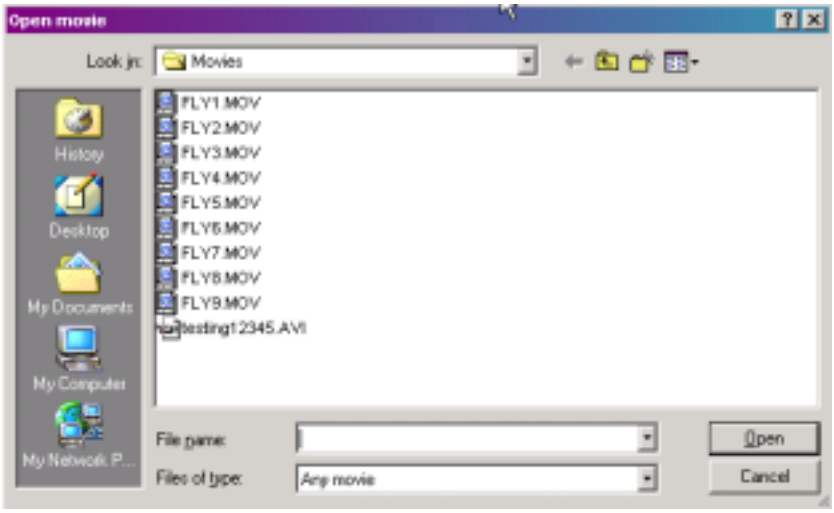


Here you can enter the observer's height above the ground or the observer's elevation above sea level. Selecting Nap of the earth will use the observer's height above the ground and will produce a terrain-following panoramic view. Selecting Constant elevation will use the observer's elevation above sea level and will produce a level-flight panoramic view. Normally you would select Draped under the Method section, this will lay your image or map over the elevation data. The Width (pixels) and Height (pixels) data entry fields will determine the original size of the perspective view. Movies are given a default 4 character name starting with FLY1 and incremented thereafter to FLY2, FLY3 etc. Type a new four character name in the Movie name (4 chars) data entry field if you want a more descriptive movie name. This will bring up the Panorama Options window.



Here you can select the direction of rotation, the start azimuth, the panorama size (default is 360 degree full circle), increment of rotation by degrees, and method of drawing (default is Drape). You may experiment with the setting but for now accept the default values and click on the <OK> button. This will bring up a Drawing Perspective n/n progress bar showing the progress of movie frame generation.

When the movie creation process has completed the Open movie window will appear.



Here you may select the movie you just created or you may display any of the previous movies you created

See the previous section on Panoramic Movies for how to convert and how to delete movie files.

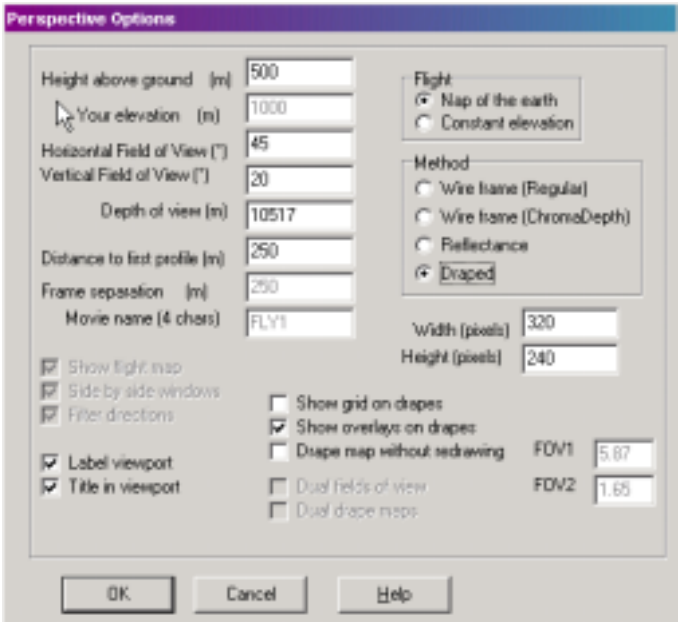
Circle Around Movies

This tool allows you to generate a movie that shows the view as you circle around one location clockwise or counter clockwise, looking inward. This can be especially helpful in examining battle/LP-OP/surveillance positions and for terrain association. The tool will create a series of movie files similar to that of the fly through.

Circle Around movies may be created over elevation-data, imagery or maps but you must always have the elevation data loaded for the area. To create the movie with imagery or map files draped on top simply have both your elevation data and your image or map open. Identify the observer's position, the end point of your field of view and the center point by double clicking on the image or map display instead of over the elevation data display.

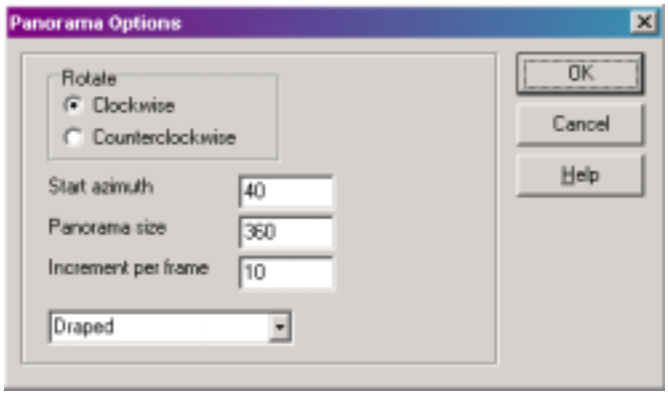
At the MicroDEM main menu select VIEW / CIRCLE AROUND. Double click anywhere on the radius of the circle around your target viewpoint. Move your mouse pointer to the end of the view field and double again. Notice as you move your mouse pointer you will drag the view triangle out to indicate the initial direction and distance of view you desire. Finally double click inside the reverse-video view triangle to identify the point your wish to circle around.

This will bring up the Perspective Options window.



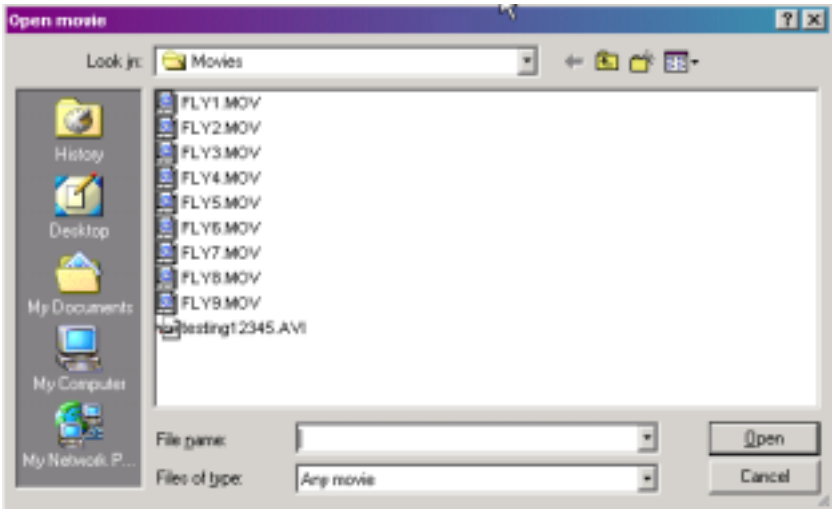
Again, here you can enter the observer's height above the ground or the observer's elevation above sea level. Selecting Nap of the earth will use the observer's height above the ground and will produce a terrain-following panoramic view. Selecting Constant elevation will use the observer's elevation above sea level and will produce a level-flight panoramic view. Normally

you would select Draped under the Method section, this will lay your image or map over the elevation data. The Width (pixels) and Height (pixels) data entry fields will determine the original size of the perspective view. Movies are given a default 4 character name starting with FLY1 and incremented thereafter to FLY2, FLY3 etc. Type a new four character name in the Movie name (4 chars) data entry field if you want a more descriptive movie name. This will bring up the Panorama Options window.



Here you can select the direction of rotation, the start azimuth, the panorama size (default is 360 degree full circle), increment of rotation by degrees, and method of drawing (default is Drape). You may experiment with the setting but for now accept the default values and click on the <OK> button. This will bring up a Drawing Perspective n/n progress bar showing the progress of movie frame generation.

When the movie creation process has completed the Open movie window will appear.



Here you may select the movie you just created or you may display any of the previous movies you created

See the previous section on Panoramic Movies for how to convert and how to delete movie files.

Route Observation 'Ambush' Movies

Route Observation movies show the cumulative visibility and instantaneous visibility along a route allowing you to plan ambush emplacements and to anticipate enemy positions. The final frame in each movie is a color-coded plot showing the percentage of the route visible from positions outside and along the route. Given a fixed vehicle speed this would translate directly to exposure times along the route. This Ambush Cover percentage visibility plot is also produced as a separate map display.

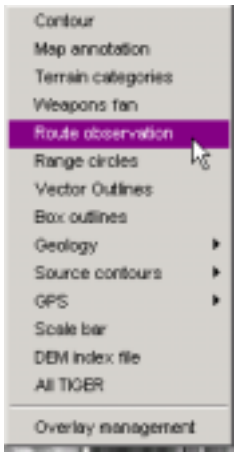
You may create ambush movies over elevation data, imagery or maps but must always load your elevation data as a minimum. Remember that available elevation data is typically very low resolution and does not usually reflect construction cuts or fills.

Various options will allow you to adjust the range, observer elevation, target elevation, frame separation along the route, opaque color overlay, transparent I.H.S. overlay, visible area plot, masked area plot or mixed visible plus masked area plot. It is not recommended to produce a mixed visible and masked area route observation movie since the results are confusing and have limited utility.

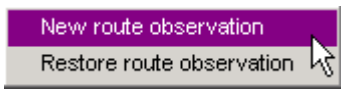
Individual frames may be saved in .BMP, .JPG or Geotif formats. **NOTE:** When the movie frames are saved as GeoTifs each frame is a georeferenced map and may be used by itself in any standard GIS software as a map background. Once the movie is created you may export to an .AVI, MPEG or animated .GIF format.

If you have high resolution IFSARE or LIDAR elevation data you can use this tool to plan routes through urban areas.

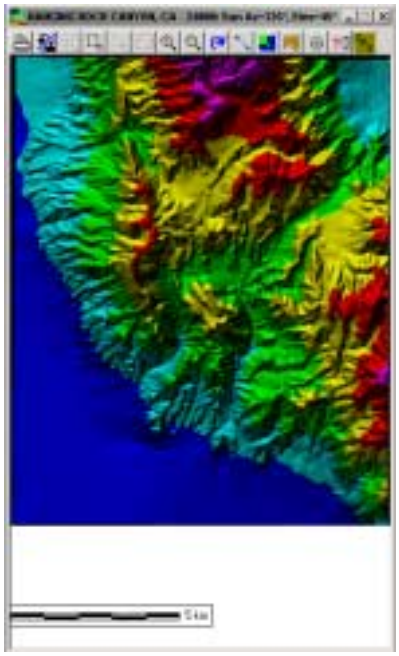
After you have your elevation and map background data displayed go to the main menu and select OVERLAY/ROUTE OBSERVATION to bring up the Route Observation popup menu.



This will bring up the Route Observation popup menu.



Here you can select New route observation to select the route for a new movie or you can select Restore route observation, pick the desired .FLT file from your ..\Mapdata\Movies directory and use a previously defined route to generate a new movie.



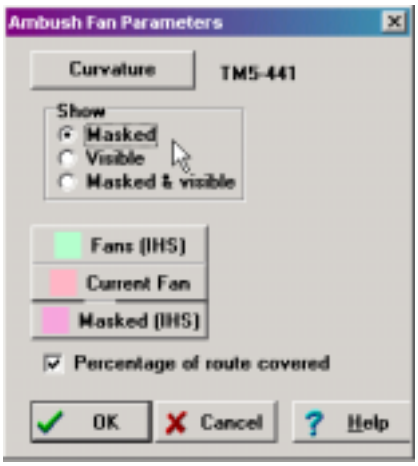
Once you've defined the last segment of your route over your elevation, image or map display right click on the display to bring up the popup menu and click on the single choice to End selection. 

This will bring up the Ambush Fan Parameters window.

Here you may set the weapon range, weapon elevation, target elevation, frame separation along the route, and change the three character name prefix for the movie. You may then click on the

<Fan color options> button → 

This will bring up the Ambush Fan Parameters window.



Here you can change the type of weapons fan to masked, visible or masked & visible. You may also change the transparent color of the specific type of fan by clicking on the <Fans (IHS)>,

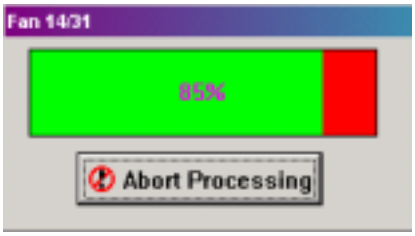
<Current Fan> or <Masked (IHS)> buttons → 

This will bring up the IHS DEM/Image Merge controls where you can adjust the color and transparency of you weapons fans.

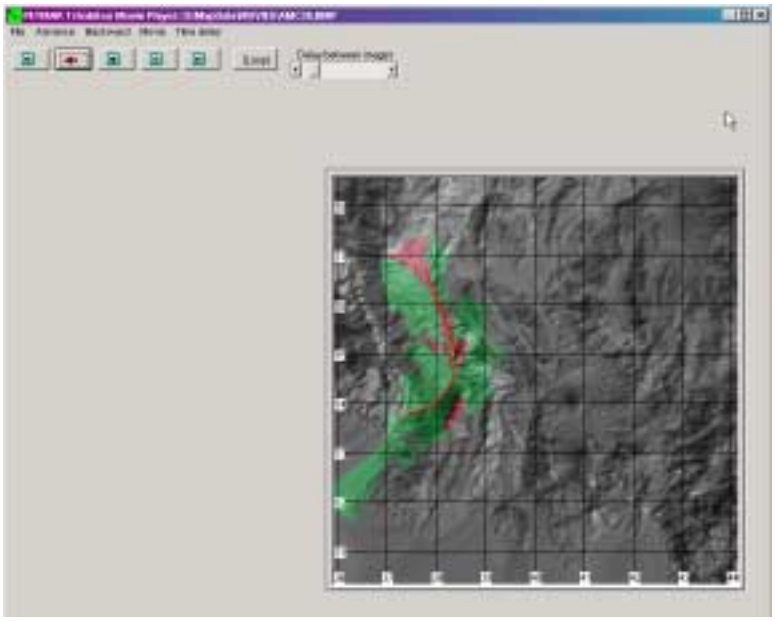
When you have completed your selections close each of the windows by clicking on the <OK>

button → 

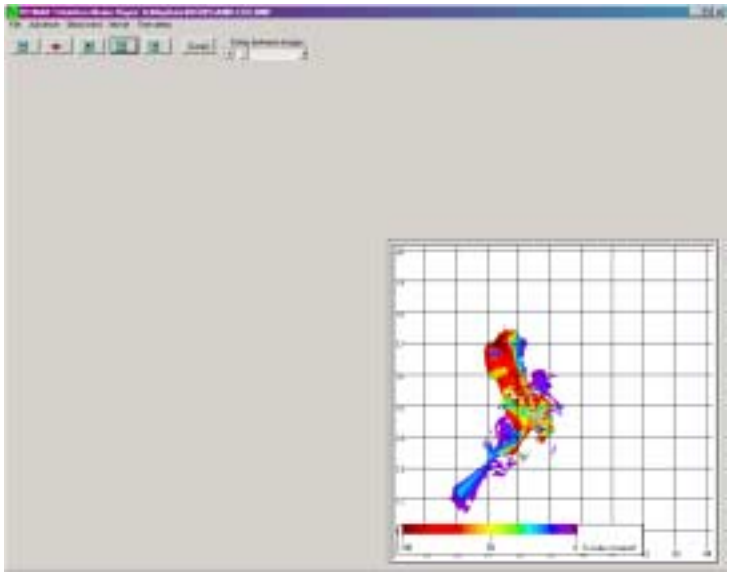
Your movie will be generated frame by frame over your display while a series of movie processing progress bars indicate how many frames will be generated along your selected route and how long it will take to complete.

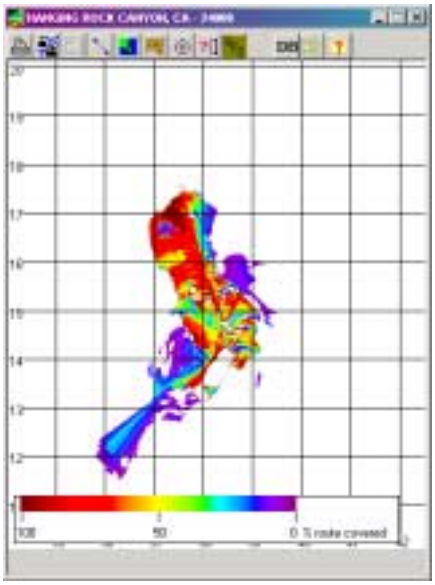


When processing is completed your movie will begin to play in the PETMAR Trilobites Movie Player.



The final frame of the movie will show a plot of Ambush Cover.





The Ambush Cover is also generated as a standard map display window when you exit the movie player. **NOTE:** The legend shows the color scheme for the percentage of the route covered from any given position along or outside the route.

GPS Use with MicroDEM

MicroDEM will allow you to connect any GPS receiver, which outputs data via serial port in National Marine Electronic Association (NMEA) sentences, to your laptop to track your real-time position over your display. The newer, green PLGR and most commercial receivers have this capability. You will need the serial (RS-232) cable specific to your model GPS receiver; this is usually sold as an optional item. PLGR users will need the 15 pin-9 pin dual female cable for this which you can order through supply using **NSN: 6150-01-375-8664.**

If you are using a military Precise Lightweight Global Position System Receiver (PLGR), a commercial Eagle/Lowrance or Trimble GeoExplorer GPS receiver you can create GPS waypoints on your display and then download them into the GPS receiver to navigate by.

Using these same model GPS receivers you may also enter waypoints in your receiver as you travel and then download them into your computer for map display in MicroDEM .

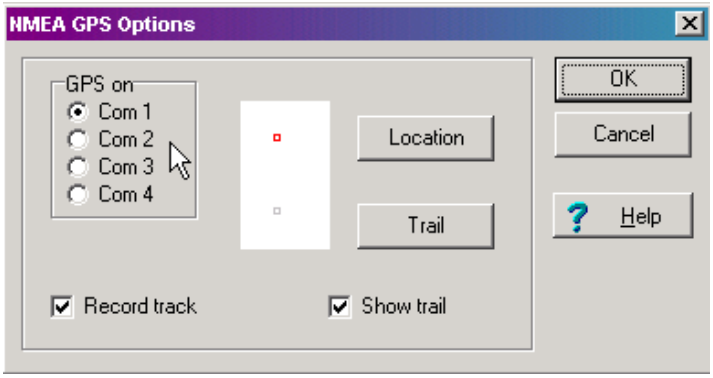
MicroDEM can use the recorded route to create a walk-through/fly-through movie.

Creating a GPS Position / Track Overlay

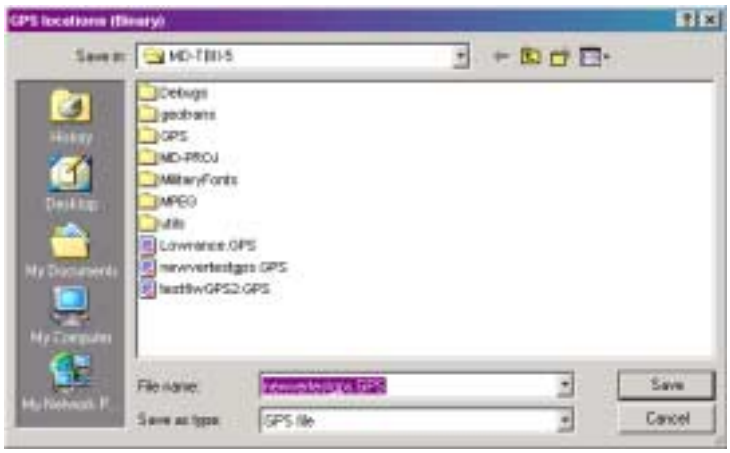
With your elevation, imagery or map data loaded, select the display you wish to use for your tracking by clicking on its title bar. The active display will have a highlighted title bar.

Make sure you have set up your Windows comm. ports correctly. Turn on your GPS and make sure you are receiving a signal. If you have not previously initialized your receiver it may take several minutes to get a good lock on the 3 to 5 satellites you'll need. Make sure your receiver is sending data to the computer Comm Port, and sending **WGS84** positions. Your receiver should be set to output **NMEA 183 output at 4800 baud, 7 data bits, 1 stop bit and no parity**. MicroDEM reads only the GPRMC string. See the user's manual for your specific model receiver.

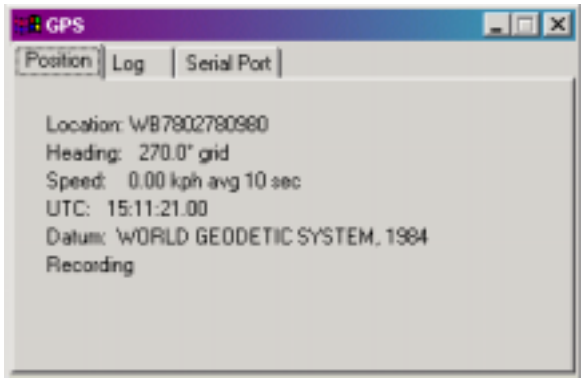
At the MicroDEM main menu select GPS/ START. This will bring up the NMEA GPS Options window.



Here you will select the comm. (RS-232) port you are using, and the desired location and trail symbology for your overlay. If you check the Record track box you will be required to provide a file name under which to save your track data. Clicking on the <OK> button will bring up the GPS Locations (binary) window.

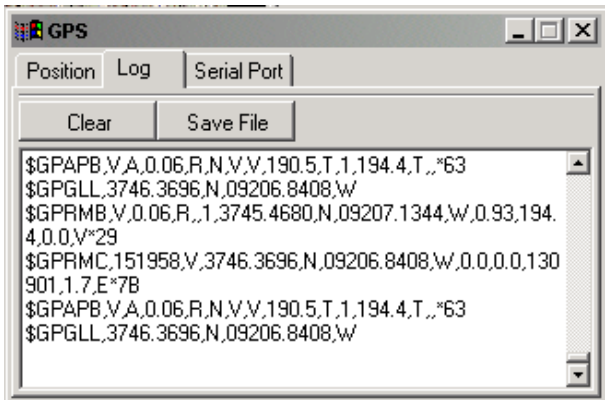


If you did not check the Record track box you will not save your data to your hard drive. In either case you will now get the GPS location readout window.

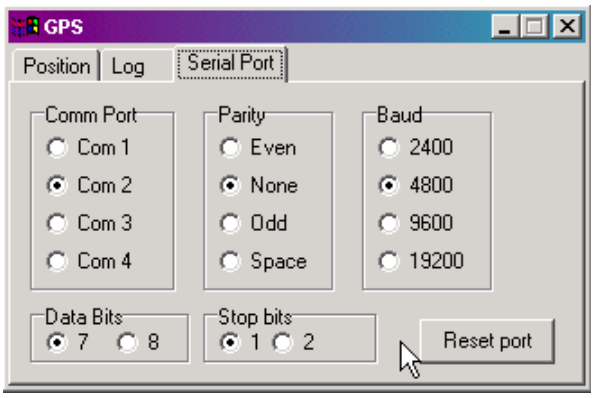


Here the location, heading, speed, Universal Time-Coordinated(Greenwich Mean Time) and receiver datum are listed. A point and time hack are dropped every two seconds.

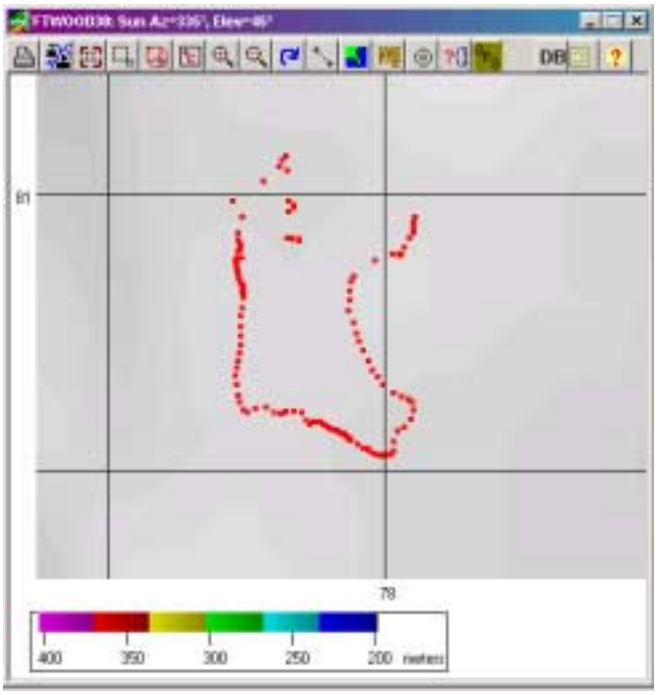
If you click on the Log tab you will see the NMEA sentences in raw form as they are dumped.



If you click on the Serial Port tab you will be given the opportunity to set up your computer's com port on-the-fly. This is a very handy feature to ease the communication setup between your GPS receiver and your computer.



You position will now be displayed real-time on your chosen map background.



NOTE: Redrawing a map will erase the GPS trail.

The speed and heading will be computed over a 20 second period or when the position has changed by 200 m, whichever comes first. You can set the units for this display by selecting Options at the main menu and clicking on the desired units radio button under the Units tab.

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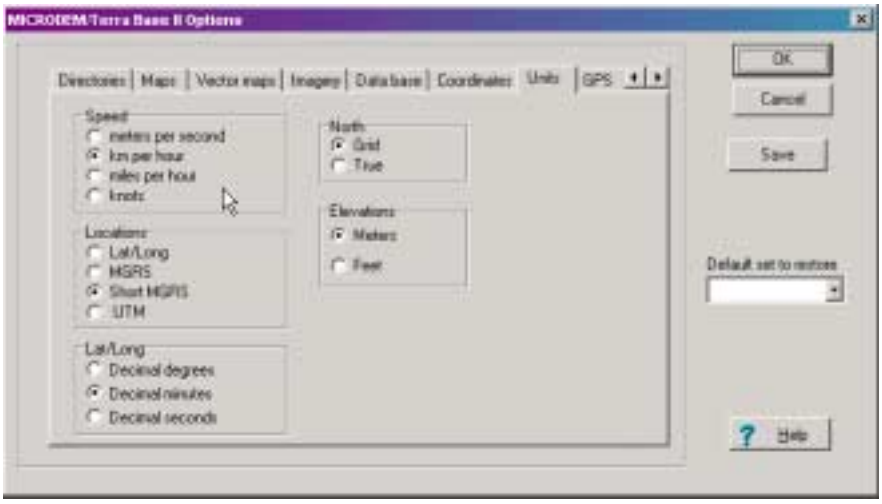


Changing units from the option menu during operation is not advised; changing the north option will result in erroneous displays of speed and heading for the next 20 seconds.

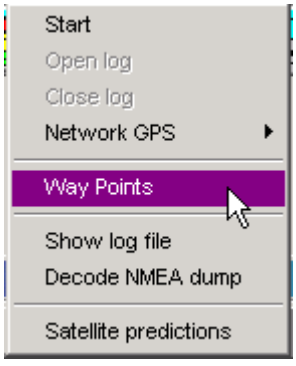
PLGR GPS Operations for Real Time Display

Insure the output is set for NMEA. Insure that the PLGR is set for CONTINUOUS operation. Insure that the five-minute automatic turn off is not selected. Use the MPS (Mission Planning Software). Insure that you have the special cable. Insure that the PLGR is set for STANDARD input and output via the serial port

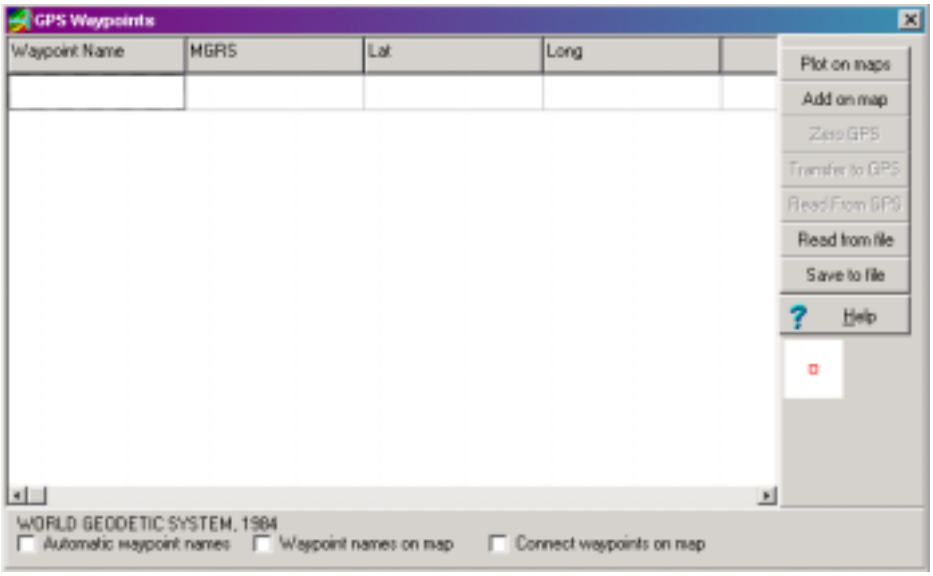
GPS Waypoints

With your elevation, imagery or map data loaded, select the display you wish to use to select your waypoints by clicking on its title bar. The active display will have a highlighted title bar.

At the main menu select GPS and Waypoints this will bring up the GPS pull down menu.



Pick the Waypoints menu choice from the menu.



The GPS Waypoints form has the following buttons:

- Plot on maps: plot the waypoints on each open map window, with the symbol shown at the bottom of the form.
- Add on maps: after selecting this, you can activate a map and select waypoints by double clicking on them. Select the locations of waypoints by double clicking. Confirm the suggested waypoint name, or modify the selection. The GeoExplorer can use 12 character waypoint names.
- Zero GPS: clear any waypoints from the GPS memory. You must confirm this selection. This will zero the locations, but the GPS (e.g. Eagle) may still think the points have valid data and may not reuse the waypoint slot.
- Transfer to GPS: load the waypoints into the GPS memory for the Trimble and Eagle GPS. For the PLGR this will save to a WPF file that you can use with the mission planning software.
- Read from GPS: read from the GPS for the Trimble and Eagle GPS. For the PLGR this will read from a WPF file created with the mission planning software.
- Read from File: read from the selected GPS waypoints (.WPF) file.
- Save to File: save to .dbf or .txt file with coordinates waypoint name and data/time.

The form has the following check boxes:

- Automatic waypoint names: automatic waypoints can be assigned, WPT1 to WPTnn.

- Waypoint names on map: when the waypoints are plotted, the name can be plotted next to the location. You can change the plotting symbol, its color and size, by double clicking on it.

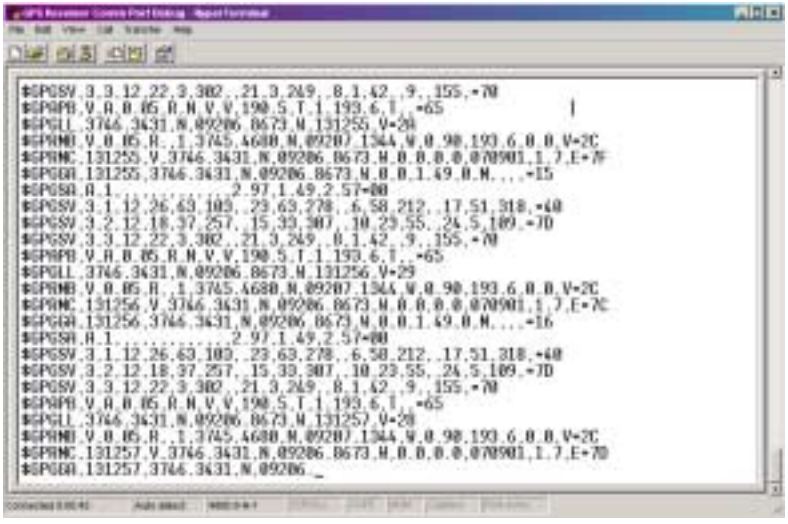
Trouble Shooting GPS Cable Connections with Hyperterminal

This shouldn't be necessary since you have the same capability now built into MicroDEM but I've retained this small section to educate users on Hyperterminal's flexibility.

If you can't get your GPS receiver to work with MicroDEM you need to check the following:

- Your GPS receiver must be capable of dumping NMEA 183 sentences via com port.
- When you setup your receiver to output in NMEA it should set its port to 4800 baud, 7 data bits, 1 stop bit and no parity but you should check this under the receiver's System Setup.
- When you setup your laptop you must also set up its com ports using the Control Panel System icon, System Properties' Hardware Device Manager. The Communications Ports are listed under Ports (Com & LPT). This should be set to greater than or equal to 4800 baud, 7 data bits, 1 stop bit and no parity.
- MicroDEM OPTIONS under the GPS tab are set to either NMEA only or the specific brand of GPS receiver.
- You have properly initiated recording of your track according to the technique list above.

You may have receiver trouble, cable trouble or you may simply be having trouble making your changes to the com port. If all else fails you can use Microsoft Windows built in Hyperterminal program to work out the problem. Hyperterminal lets you select a com port rather than a modem as your communications device. You may then set and test com port settings on-the-fly.

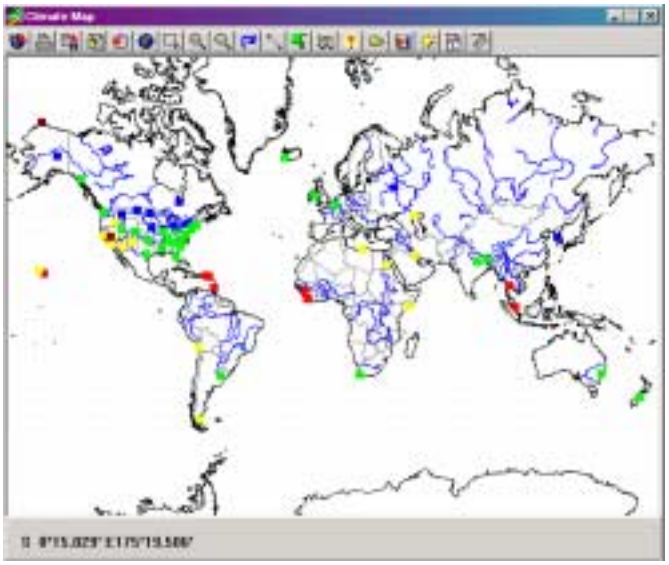


When you have your port settings are correct you will see the various NMEA sentences in readable text as they are dumped from the GPS receiver.

Weather / Climatology

The KOPPEN CLIMOGRAPH provides climate information for 68 locations around the world. Climate information includes annual and monthly temperature and precipitation by number and graphical format. To access this tool go to the MicroDEM main menu and click on the

<KOPPEN CLIMOGRAPH >button→ 



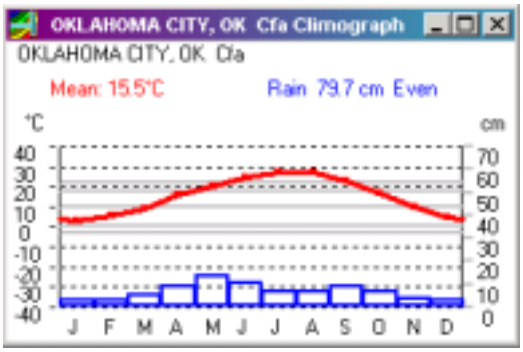
The Climate Map will open with a simple world vector map (world .sin) with small colored symbols representing cities with climate data.

If the city your are interested in is buried in a cluster of other cities you can click on the

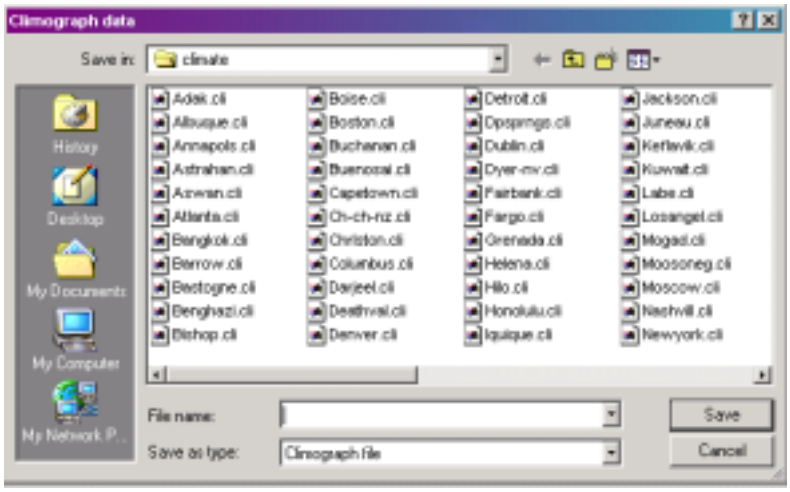
<ZOOM IN> button to perform a windows subset →. 

Now click on the Climograph on Click button → 

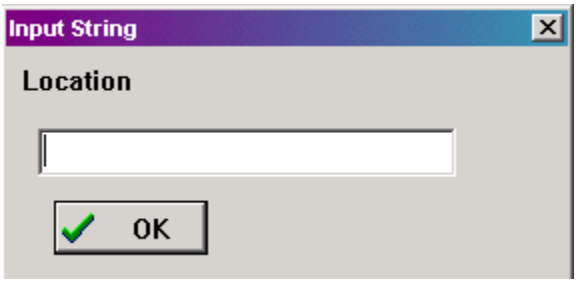
then double click on any of the city locations to get the annual temperature and precipitation data for that city.



You can also enter your own climatic data for any location in the world by clicking on the <NEW CLIMOGRAPH> button → 



Here you will enter the file/city name for your new climograph.

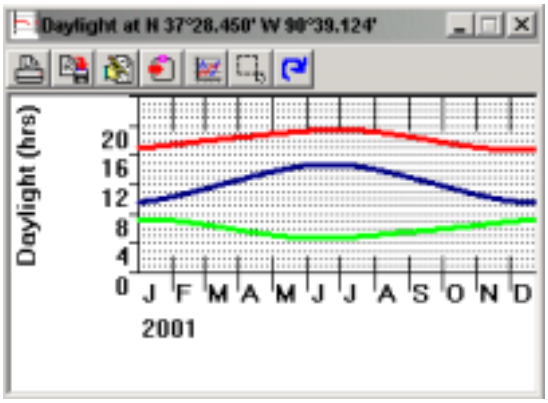


This will bring up the Input String pop-up window where you will enter the coordinates for the new climograph location.

This will bring up another window where you may enter the coordinates for the new climograph location.

You may display an annual graph of the sunrise/sunset and day-length for any location in the world by clicking on the < **DAYLIGHT ON CLICK>** button → 

and then double clicking anywhere on your Climate Map.

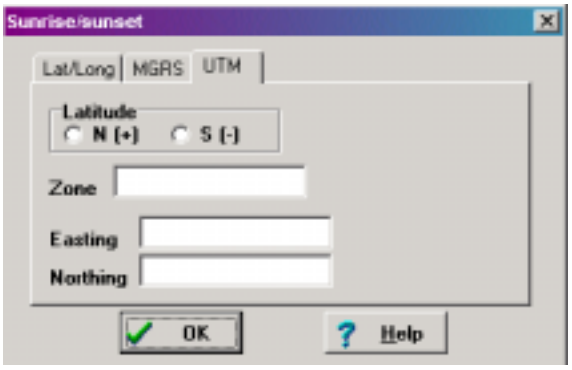


Solar and Lunar Data

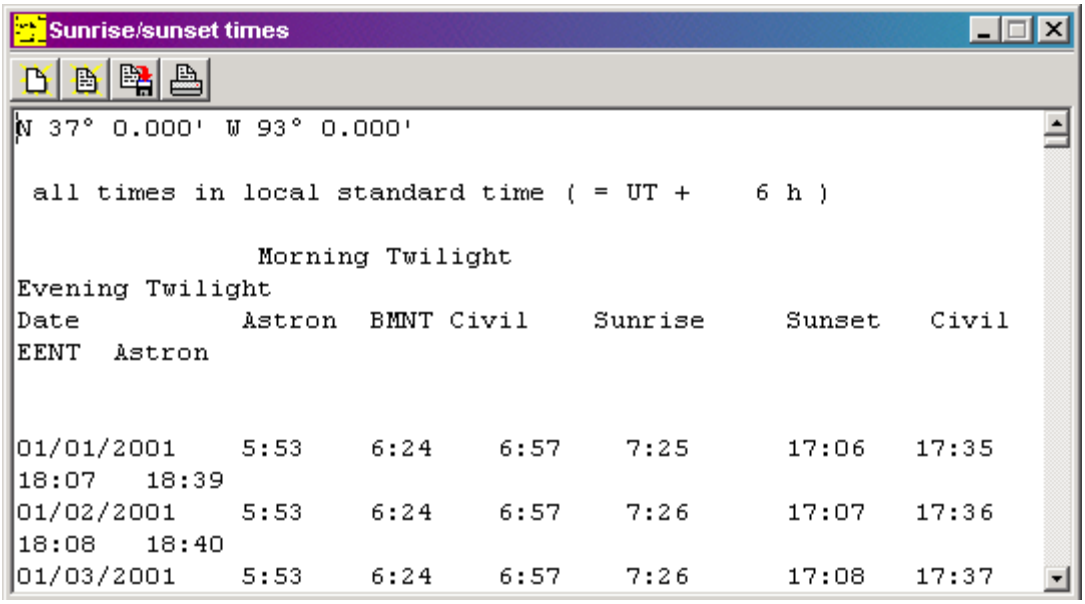
SUNRISE / SUNSET

This tool provides a tabular printout of the sunrise and sunset times, to include nautical (BMNT/EENT) and civil twilight for any location on earth, based on latitude and longitude.

At the main menu click on the <SUNRISE/SET> button → 



This will bring up the Sunrise/sunset window where you will enter the coordinate for the area you wish to investigate. This data may be entered in Lat/Long, MGRS or UTM by clicking on the tab for the coordinate format you wish to utilize.

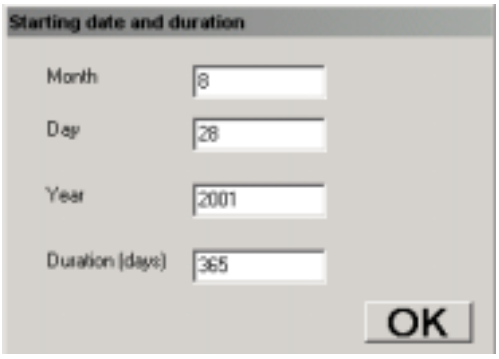


NOTE: This function does **not** adjust for Daylight's Saving Time (April – October), so you'll need to add one hour to the times shown if your area changes times.

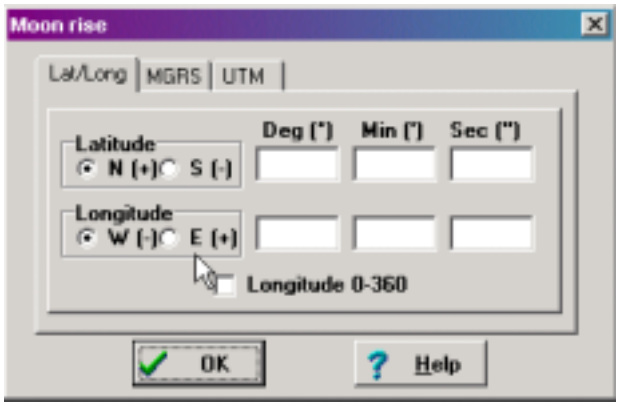
MOONRISE/MOONSET

This tool provides a tabular printout of the moonrise and moonset times for any location on earth.

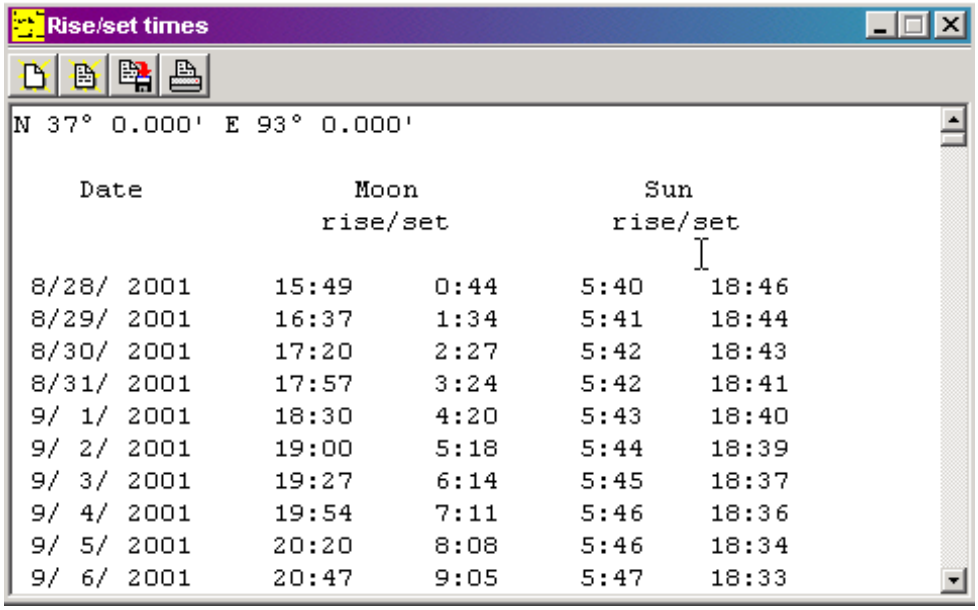
At the main menu click on the <MOONRISE/SET> button → 



This brings up the Starting date and duration window where you will enter the starting date by month, day and year and the duration or length of the table.



This will bring up the Moonrise data entry window where you will enter the coordinates for the area wish to investigate. This data may be entered in Lat/Long, MGRS or UTM by clicking on the tab for the coordinate format you wish to utilize. Moon phases are displayed on the bottom of this form.



NOTE: This function does **not** adjust for Daylight's Saving Time (April – October), so you'll need to add one hour to the times shown if your area changes times.

Chapter 5 Advanced Functions

This chapter covers several of the more esoteric features found in MicroDEM. These functions are either seldom used by the average MicroDEM user or require greater effort to utilize.

Stream Profiles

This option allows you to digitize a stream profile from elevation and image or map data on your display. This function may be used to graph the cross section of any linear feature such as a stream or road. **Be aware** that man made features such as roads will have cuts and fills that may have been created after your elevation data was generated and may not be accurately reflected in your elevation data.

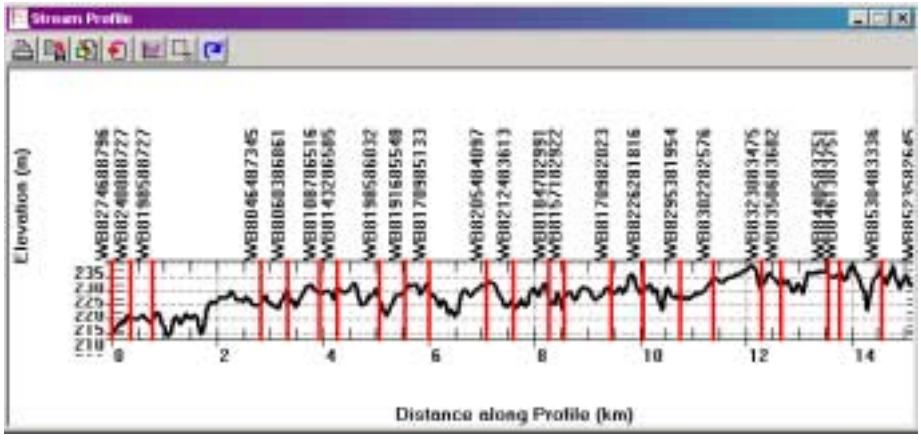
Open both the elevation data and map or imagery for your area of interest and zoom in until you can accurately define your route. If you are using Controlled Image Base (CIB) or Compressed Arc Digitized Raster Graphics (CADRG) don't worry about part of your route being off screen, you can use the scroll bars to access more of your map or image while delineating your path.

If you are using ADRG you must have your entire route visible on the map display. The size of the map subset you display is controlled under OPTIONS/IMAGERY tab and the ADRG X tiles and ADRG Y tiles data entry fields. Each tile is 128 x 128 pixels and the default setting is 8 x 6. A typical 1:50 TLM is about 43 x 46 tiles should you need to display the entire map.

At the main menu select CALCULATE / STREAM PROFILE. Double click on the starting point for your route or stream. Continue double clicking to identify nodes along your route until your reach the end. Double click to identify the last point in your route then right mouse click to bring up and click on the End Selection menu → 

NOTE: You cannot do any other operations while digitizing except zooming in, zooming out and using your scroll bars. All other operations will reset your stream profile and you will have to start over.

The program will draw the profile with the start-point on the left and end-point on the right.



The horizontal scale will show both the distance along the profile and the coordinates of the nodes or intermediate points along the route. The vertical scale shows the elevation relief along the route.

Pipeline Automated Planning Aid Version II

The PAPA function will allow you to delineate the route for your planned pipeline , will display a cross section of the route and will calculate how many SETS, KITS & OUTFITS you will need to construct the pipeline. Once graphed PAPA will allow you to edit and add or remove pump stations.

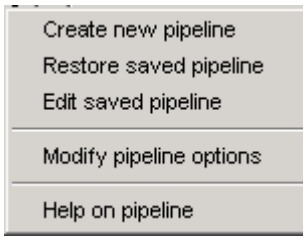
Two different methods of accessing and utilizing the PAPA function are listed in this section. The PAPA function may be accessed via the PAPA icon in your Windows Program Group or it may be started directly from MicroDEM by clicking on the <PL> PAPA- Pipeline button.

NOTE: The streamlined version of PAPA available from the program group limits you to using DTED, CADRG and CIB. The PAPA function available from regular MicroDEM will allow you to use a much wider variety of elevation, image and map data.

PAPA in MicroDEM

Start the PAPA function from MicroDEM by clicking on the <PAPA Pipeline> button → 

If you don't have a <PAPA Pipeline> button at your main menu then go to the main menu and select OPTIONS / MENU CHOICES tab and check the PAPA – pipeline box. This will bring up the PAPA choices menu.

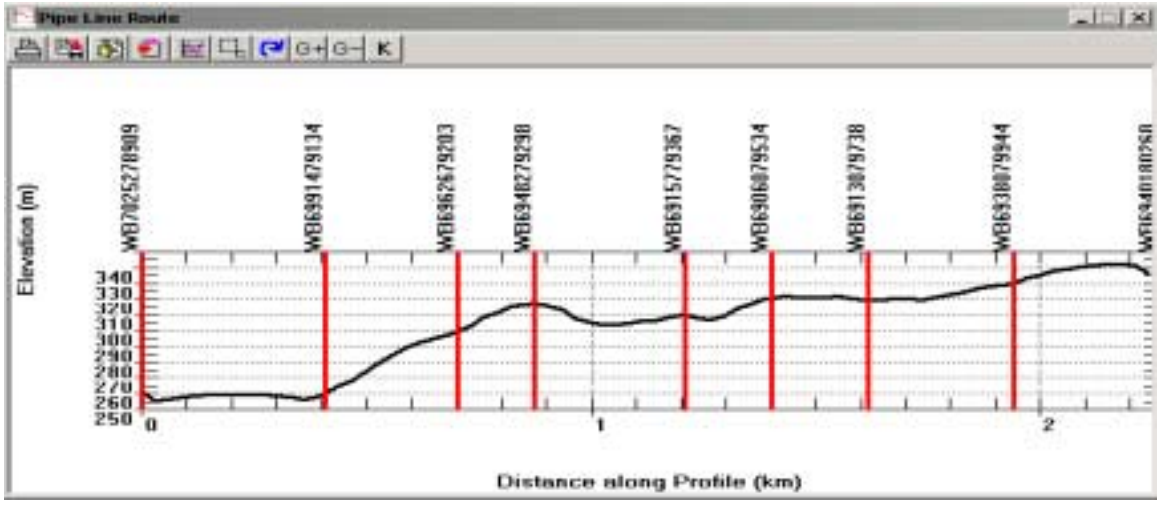


Here you can choose to define a new pipeline route, restore a previously saved pipeline, redisplay your old route over your background map to act as a guide in delineating a new route, or modify pipeline default options.

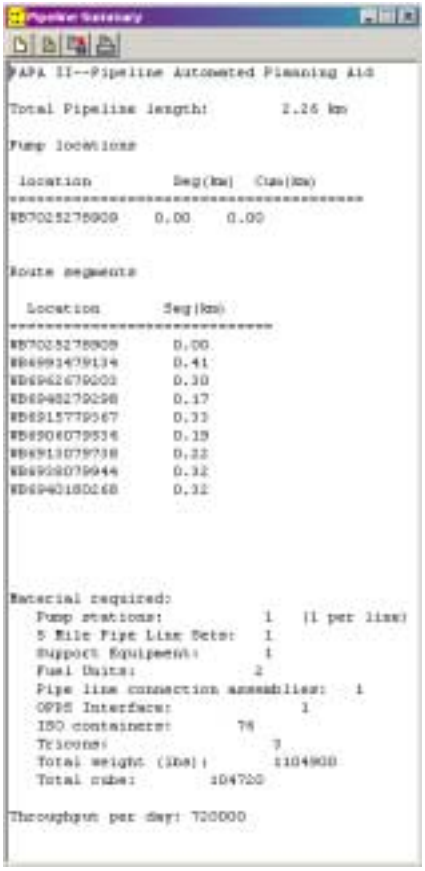
Selecting Create new pipeline will allow you to define your route. On your map display double click on the starting point for your route. Continue by double clicking on the intermediate points along your route and end by double clicking on the end point for your route.

When you've completed delineating the route right mouse click to bring up the End selection menu and click it → 

Two windows will be generated, one containing the graphical cross section of your pipeline route, the other containing the textual information for your pipeline summary.

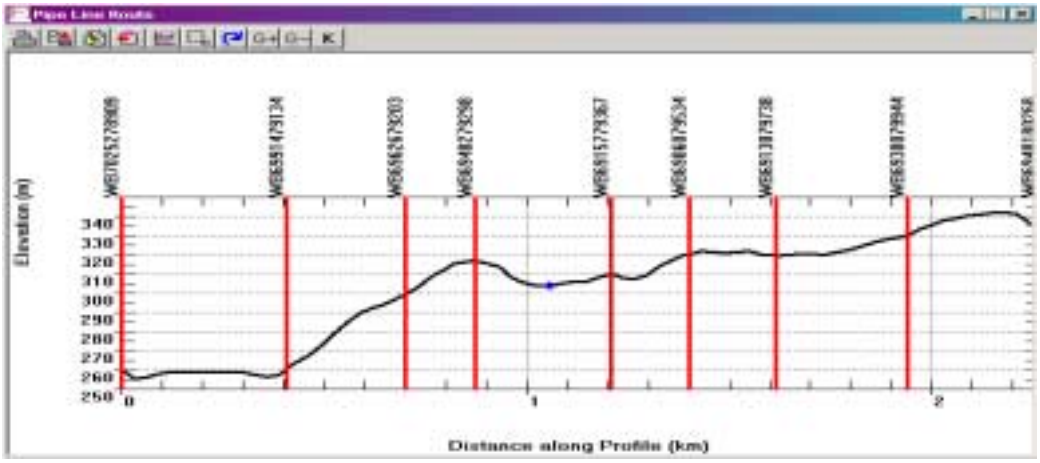


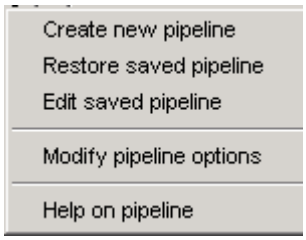
This window may be rescaled by clicking on its edge or corner and holding down the left mouse button while dragging to resize the window. The horizontal scale shows the distance along the route in kilometers and the coordinate locations for your intermediate points/nodes along the route. The vertical scale shows the terrain relief along the route in meters.



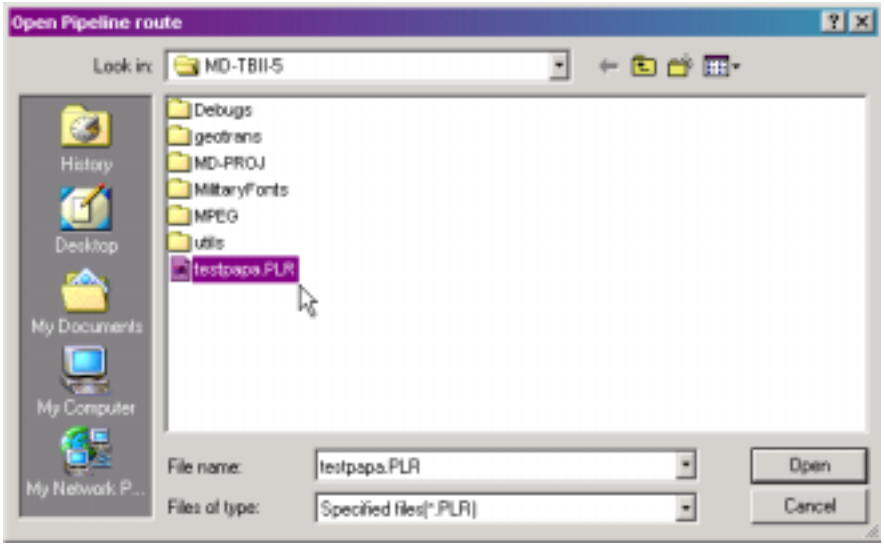
Additional pumps may be added or deleted anywhere along graphical cross section by clicking on the <Add Pump Graphically>, <Graphical Remove Pump> and <K> buttons → G+ G− K

An icon for the pump will be placed on the graph and a new Pipeline Summary will be generated.

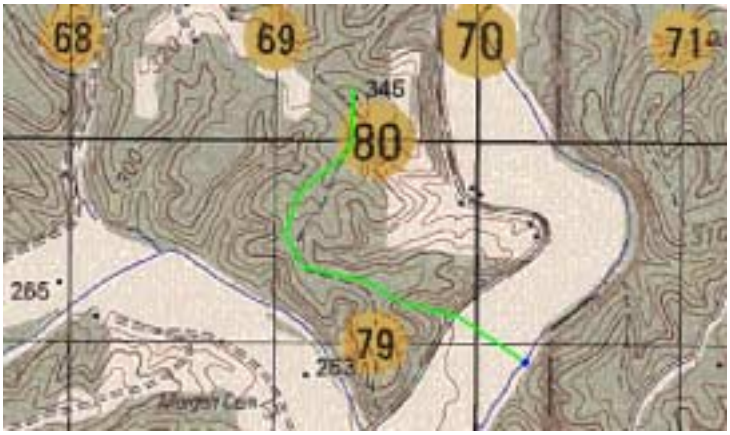




Selecting Restore saved pipeline will bring up the Open Pipeline route window.



Here you can select any previously saved PAPA (.PLR) file. This will redisplay the route over your background map and the two original PipeLine Route graph and Pipeline Summary windows.

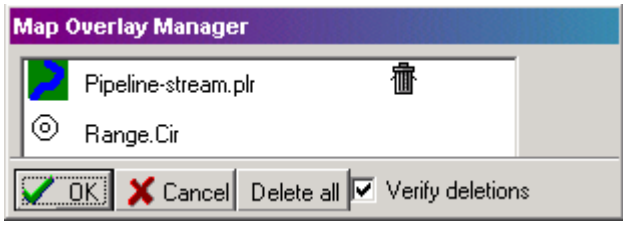


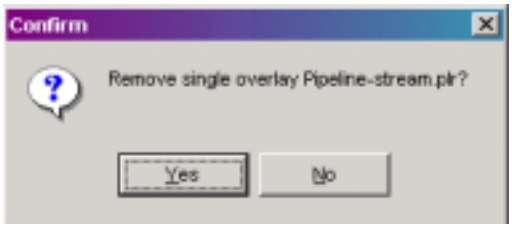
Selecting Edit saved pipeline will bring up the Open Pipeline route window where you can select any previously saved PAPA (.PLR) file. The original pipeline route will be redisplayed over your background image/map. You can drag any point on the route to reposition the route.

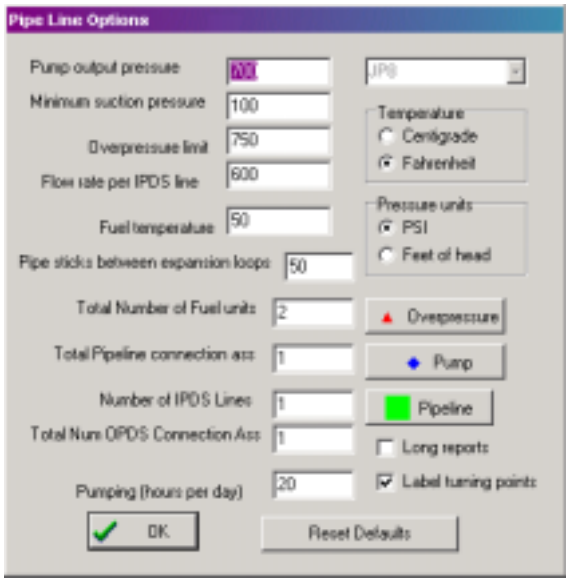
This will act as a guide as you redefine a new route.

Selecting Modify Pipeline Options will bring up the Pipe Line Options window.

Pipeline overlays may be removed by selecting OVERLAY / OVERLAY MANAGER at the main menu. This will bring up the Overlay Manager unless you have only one overlay in which case you'll get the Confirm – Remove single overlay pop-up window.





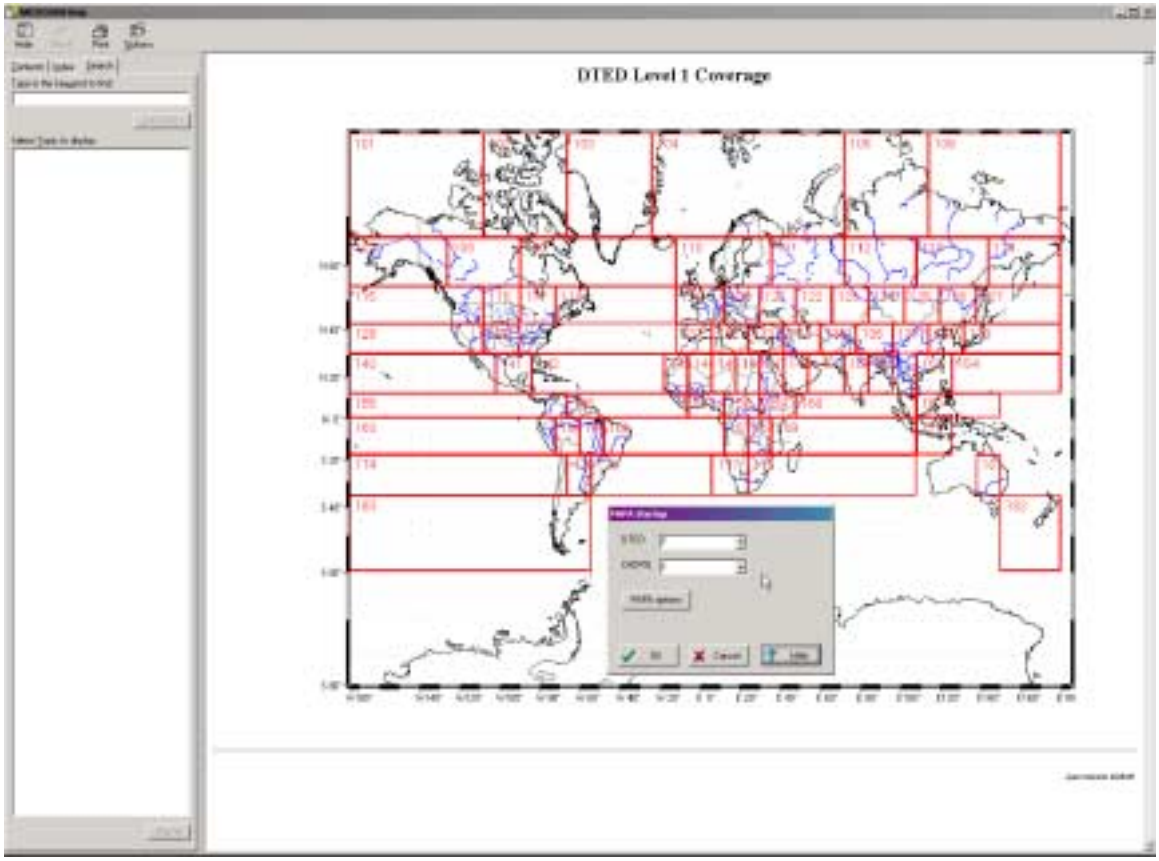


Here you may change a wide variety of default setting by simply typing the new value in each data entry field. Close this window by clicking on the <OK> button.

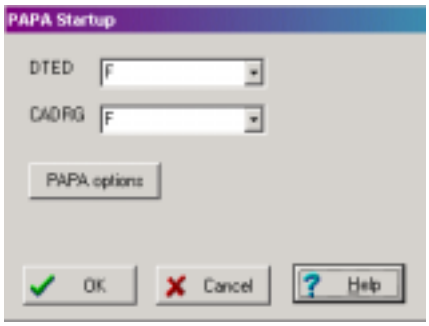
PAPA from the PAPA Icon

Click on the PAPA Icon in your MicroDEM program group →

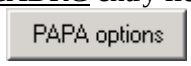
The PAPA icon will start the program with a -PAPA command line parameter. This gives you a very restricted set of the menu options used only for creating pipelines. You must have the CDROMs with your elevation, map and (optional) imagery data on hand for this procedure.

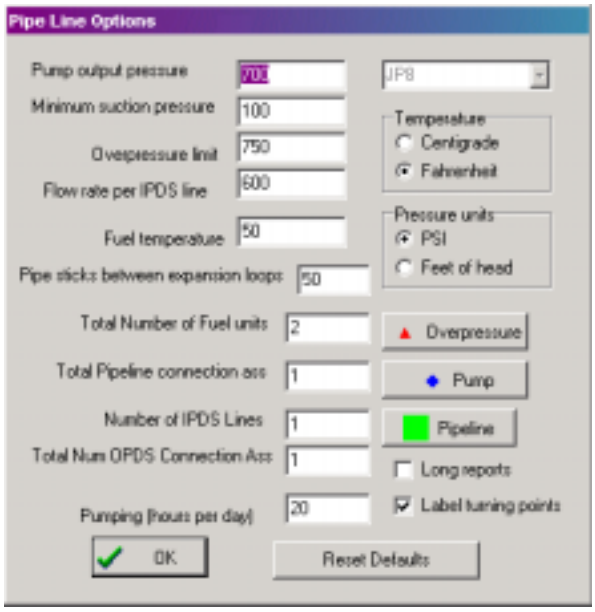


The program brings up a page from the HELP section showing world DTED Level 1 coverage and the PAPA Startup window.



Here you must identify the CDROM drive identification you will be using to load the data for your area of interest by selecting drive ID letters from the DTED and CADRG entry fields.

Alter default settings by clicking on the <PAPA options> button → 



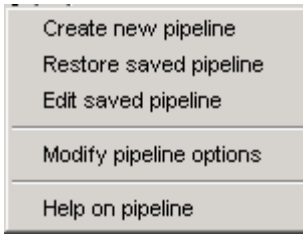
Here you may change a wide variety of default setting by simply typing the new value in each data entry field. Close this window by clicking on the <OK> button.

Click on the <OK> button in the PAPA Startup window to open the DTED for your region. Level 2 CDs, if available, will replace the 1xx series names with a 2xx name. They may also have a letter suffix, since up to 9 Level 2 CDs will be required for each level 1 CD; these suffixes do not appear to be standardized, but each CD should have a location map on the jewel case. You will only be able to work with the region for which you load DTED. See the MicroDEM HELP section on PAPA.

Open the CADRG for your region. You should use larger scale Joint Operational Graphics (JOG) or Topographic Line Map (TLM) products. Loading of the CADRG will now be done automatically. The CADRG covering the DTED you just loaded will be opened.

Open the CIB for your region. This is optional. You might prefer to define the pipeline route over CADRG or you might prefer CIB.

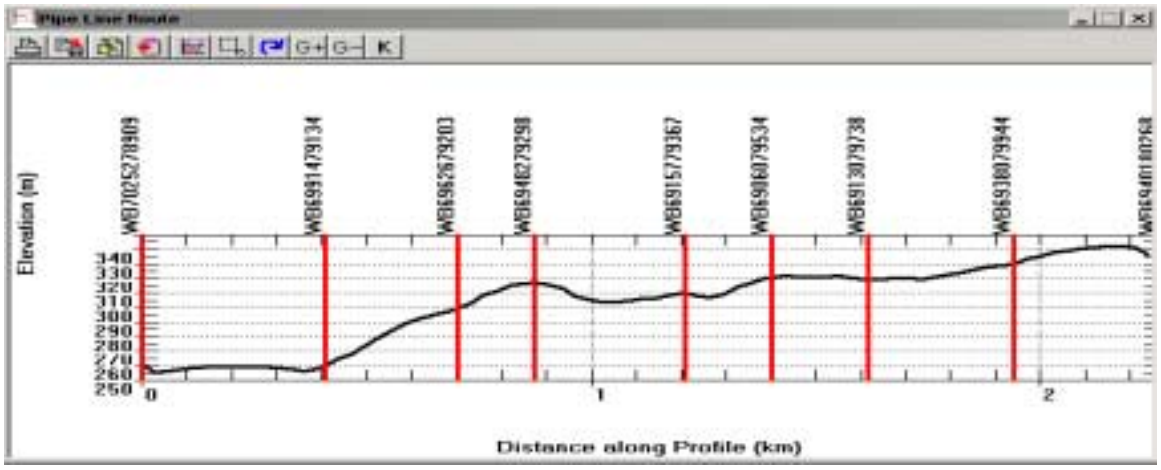
Click on the <PAPA pipeline> button at the main menu → 



This will bring up the menu. Click on Create new pipeline to define a new pipeline route. Double click on the starting point for your route. Continue by double clicking on the nodes or intermediate points along your route and end by double clicking on the end point for your route.

When you've completed delineating the route right mouse click to bring up the End selection menu and click it → 

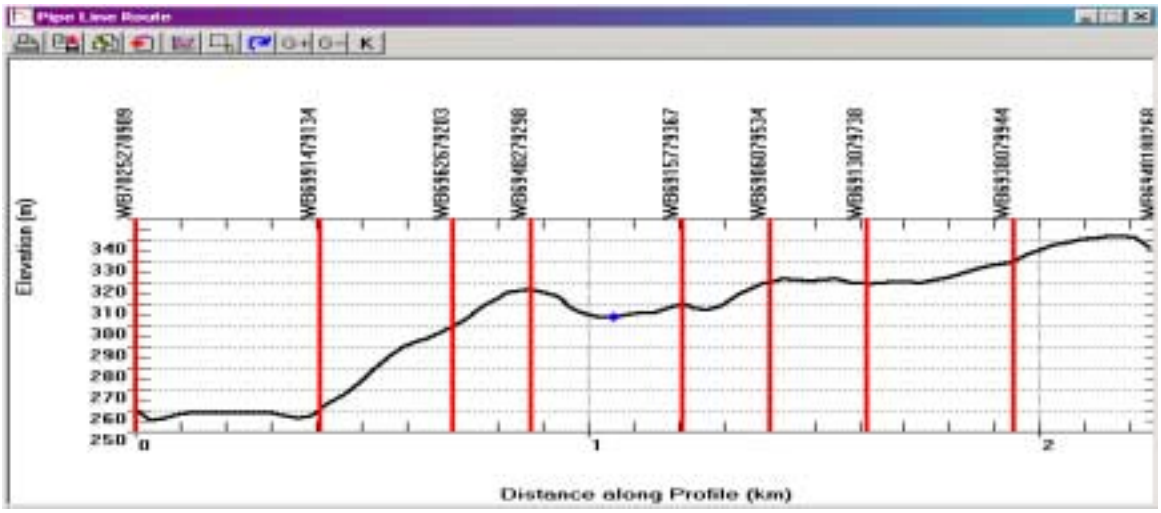
Two windows will be generated, one containing the graphical cross section of your pipeline route, the other containing the textual information for your pipeline summary.

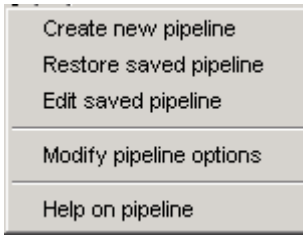


This window may be rescaled by clicking on its edge or corner and holding down the left mouse button while dragging to resize the window. The horizontal scale shows the distance along the route in kilometers and the coordinate locations for your intermediate points/nodes along the route. The vertical scale shows the terrain relief along the route in meters.

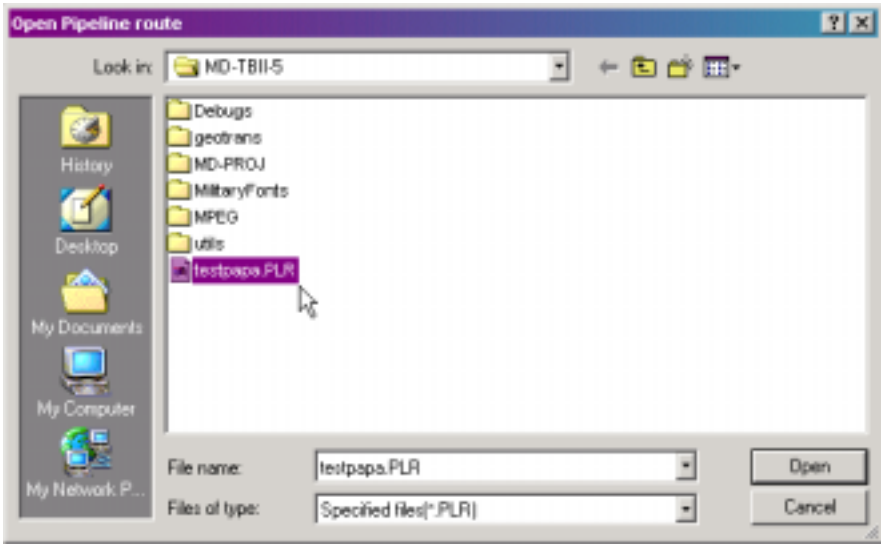
Additional pumps may be added or deleted anywhere along graphical cross section by clicking on the <Add Pump Graphically>, <Graphical Remove Pump> and <K> buttons → 

An icon for the pump will be placed on the graph and a new Pipeline Summary will be generated.

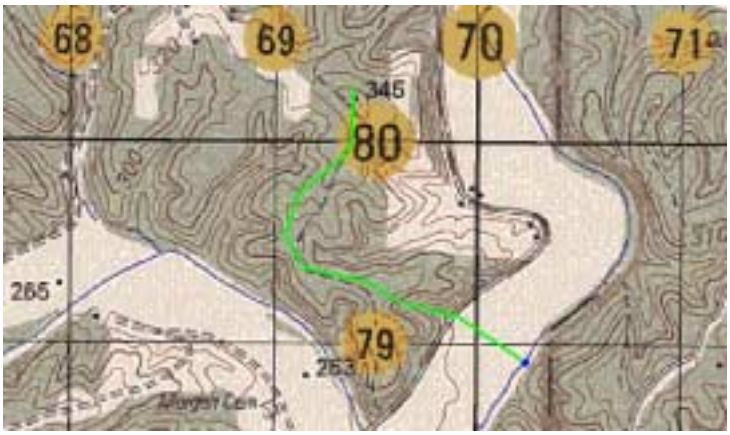




Selecting Restore saved pipeline will bring up the Open Pipeline route window.



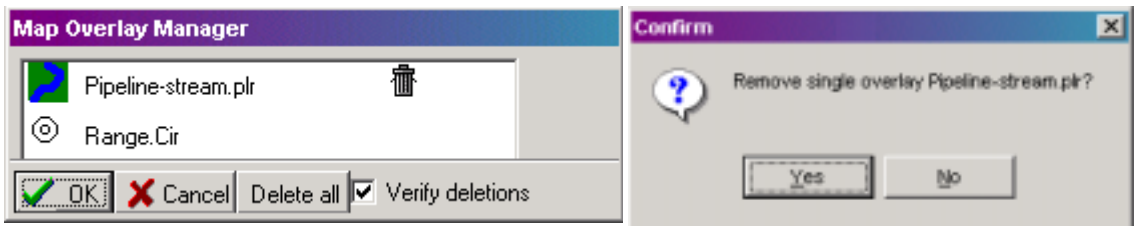
Here you can select any previously saved PAPA (.PLR) file. This will redisplay the route over your background map and the two original PipeLine Route graph and Pipeline Summary windows.



Selecting Edit saved pipeline will bring up the Open Pipeline route window where you can select any previously saved PAPA (.PLR) file. The original pipeline route will be redisplayed over your background image/map.

This will act as a guide as you redefine a new route.

Pipeline overlays may be removed by selecting OVERLAY / OVERLAY MANAGER at the main menu. This will bring up the Overlay Manager unless you have only one overlay in which case you'll get the Confirm – Remove single overlay pop-up window.



OpenGL 3D Views

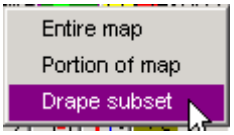
OpenGL is a new interactive function to display draped imagery and maps over elevation data. It requires that you have OpenGL installed on your machine.

Load the elevation data for your area of interest. Load the imagery and/or map data for your area of interest. OpenGL views may be created over elevation displays, imagery or map displays but you must always have your elevation data loaded for your AOI.

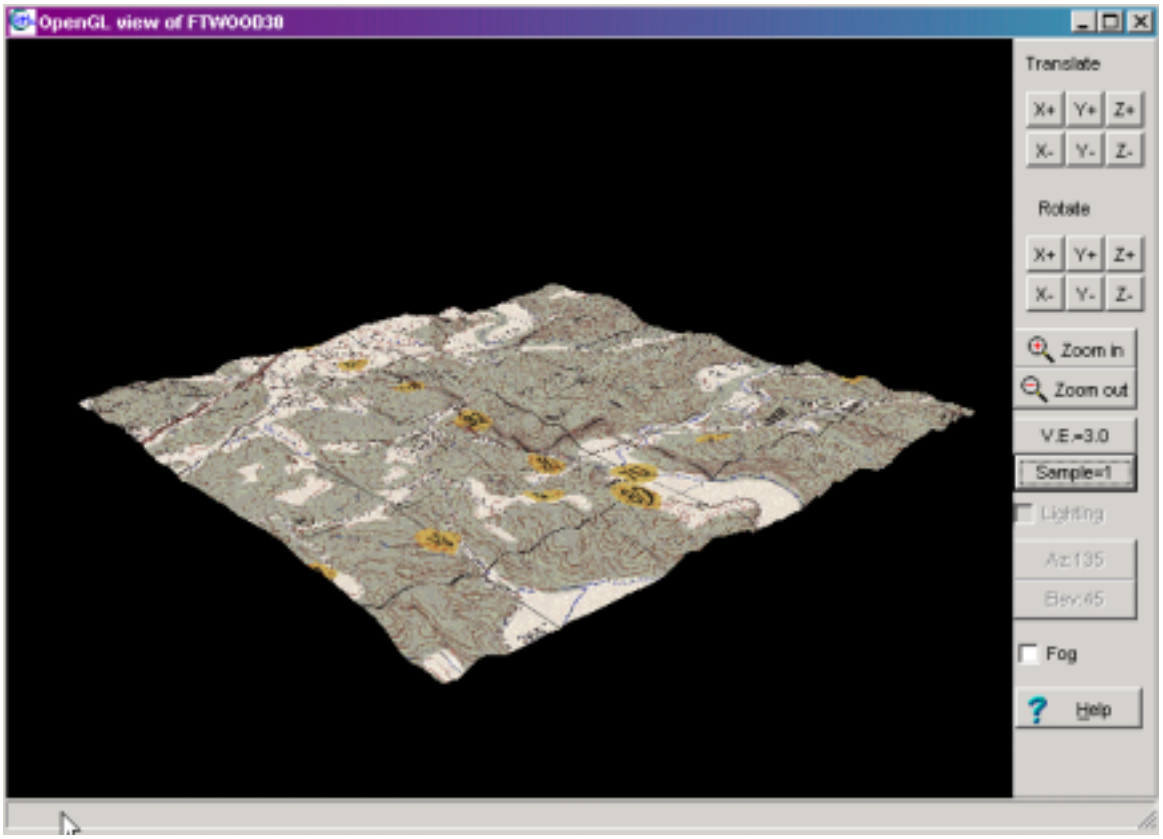
Click on the display you wish to use as your drape. Note that the title bar is now

highlighted. At the main menu bar click on the <OpenGL> button →

This will bring up the OpenGL menu.



Select Drape subset from the menu then click on the northwest corner of your area of interest, hold down the left mouse button and drag the reverse-video box to the southeast corner of your area of interest.



An interactive 3D display of your AOI will be generated, as shown above. The default size of your 3D display is 640x480 pixels.

Click on the <Maximize> button → 

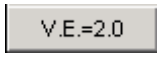
This button is located at the top right corner of your OpenGL 3D display. Clicking on this button will enlarge the display to full screen mode.

The resolution of your image will be low at first, because the sampling rate is initially set to a low value. You will probably want to immediately change your sample value by

clicking on the <Sample> button → 

This button shows the current sample value. The sample value is a ratio of pixels available to those displayed. Sample=4 means that (1:4) only every fourth pixel in every fourth row is displayed. You can lower this ratio to a max value of Sample=1 where (1:1) every pixel available is displayed. Sample=1 uses 16 times more memory than sample=4.

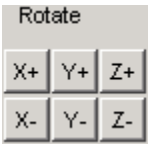
NOTE: Large areas of high-resolution imagery will stress the capabilities of your computer. A faster CPU and more RAM will improve the performance of this function. Watch the lower left corner of the OpenGL display. This area will show the number of triangles that have been processed during the redisplay of your image. The maximum number of triangles is set at the Views tab of the Options menu. There will be two triangles for every "block" within the DEM. To get under the limit, the data will be sub-sampled, which will be shown on the <Sample> button. More triangles means more time to generate each view.

Click on the <Vertical Exaggeration> button → 

This button shows the current vertical exaggeration value. Areas of low relief usually need to have their vertical-scale exaggerated in order to look right.

Click on any of the <Translate> buttons → 

These controls are used to move the 3D view within the OpenGL display along any of its three axes.

Click on any of the <Rotate> buttons → 

These controls are used to rotate the 3D view within the OpenGL display about any of its three axes.

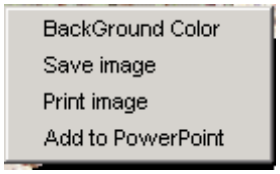
Addition controls are available for reflectance plot of elevation data only. These controls are used if you elect to use the Entire Map or Portion of Map options from the OpenGL menu.

- Lighting: if you enable lighting, a drape subset will be transformed into a DEM only view with lighting. There is no switching back one lighting is selected.

- Azimuth: sun location for lighting

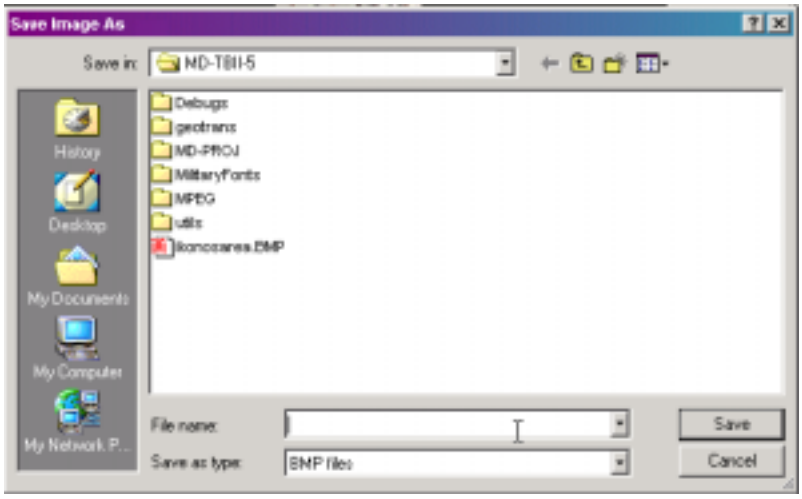
- Elevation: sun elevation, above the horizon, for lighting
- Fog: turn fog on or off.

Additional Options are available by right clicking on your OpenGl 3D display.



Selecting Back Ground Color from the menu will bring up the color selection window for your OpenGL 3D display's background
.

The Save image option will bring up the Save Image As window.



Here you can save the 3D display as a .BMP, .JPG or .GIF image.

Selecting Print Image from the menu will perform a quick plot of the 3D display to your default printer.

Selecting Add to Power Point from the menu will copy the display to a new slide in your Power Point presentation.

Stereo Anaglyphs

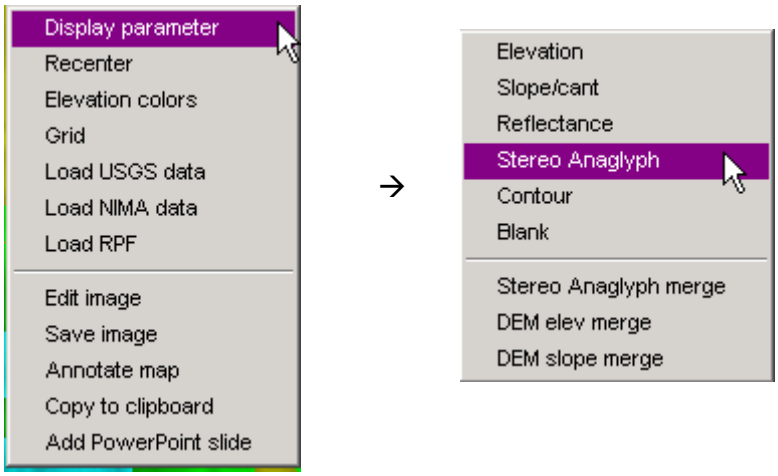
3D stereo imagery is viewable with red/blue glasses.

See the MicroDEM HELP section on Sources of 3D Anaglyph Glasses.

The Terrain Visualization Center web site lists three of many sites selling a wide variety of red/blue glasses in paper and plastic. The URL for the specific TVC web page is **http://www.wood.army.mil/TVC/MicroDEMV5/ordering_redblue_glasses.htm.** These links are not intended as an endorsement of these specific sites but are merely provided as a service to the MicroDEM/TerraBase II GIS community.

Stereo imagery may be produced in 2D map views, 3D Perspective views and in movies. Three-dimensional images may be produced over elevation data, imagery or maps but you must always have your elevation data loaded.

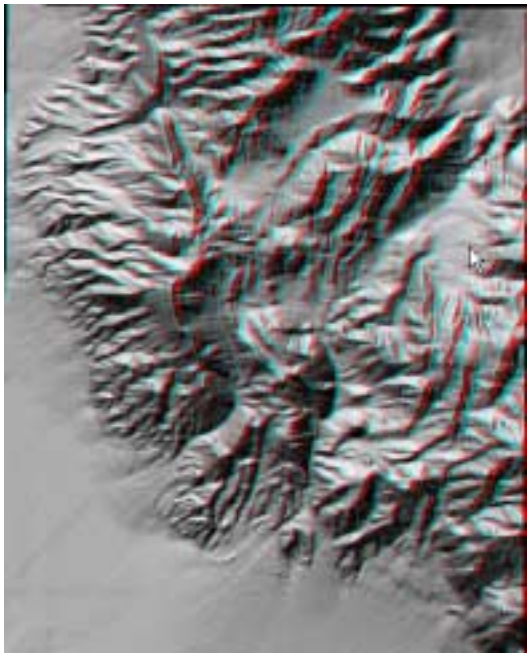
To produce a simple stereo view of your elevation data simply right click on your display to bring up the first pop-up menu. Select Display parameter, this will bring up the second pop-up menu.



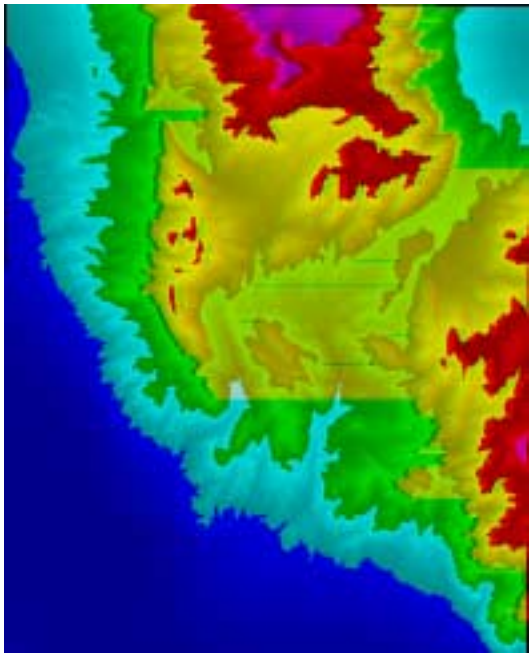
Select Stereo Anaglyph if you want to display your image as a 3D gray-scale shaded relief.

Select Stereo Anaglyph merge if you want to display your image as a 3D color Elevation Tint.

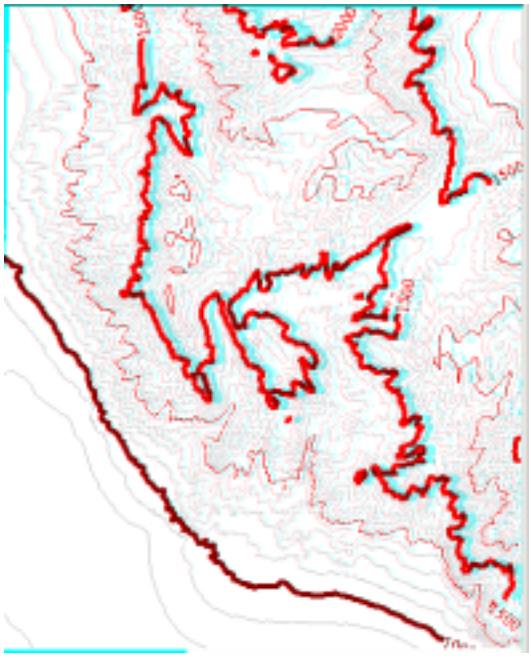
You may use this same function to display your elevation data as 3D contours by first selecting Display parameter from the first pop-up menu then selecting Contour and then Stereo Anaglyph merge from the second pop-up menu.



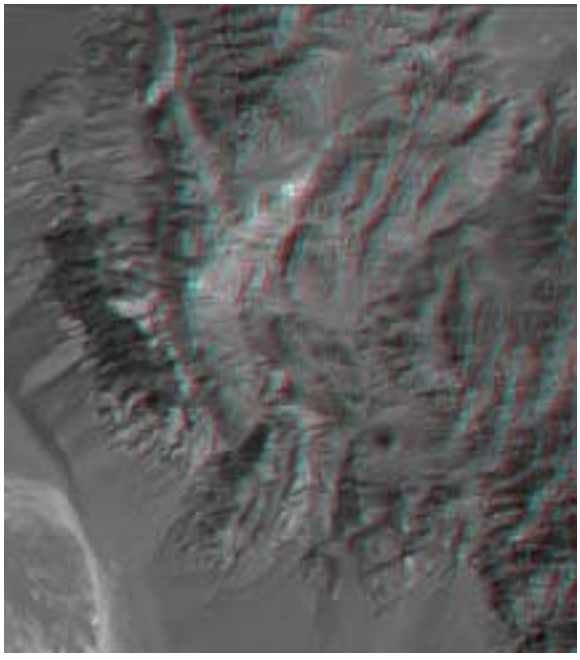
Shaded Relief Stereo Anaglyph of Elevation Data



Elevation Tint Stereo Anaglyph of Elevation Data

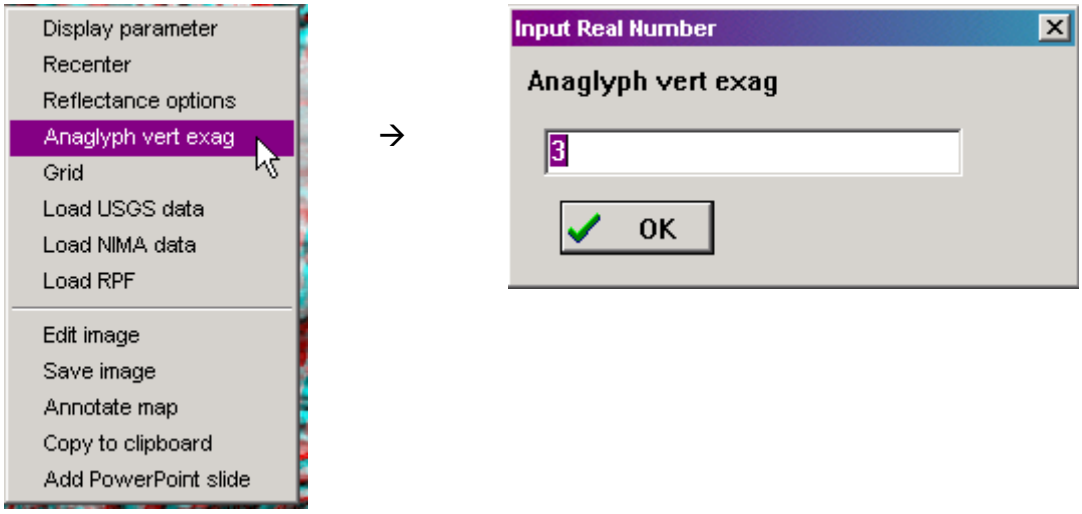


Stereo Anaglyph of Contours from Elevation Data.

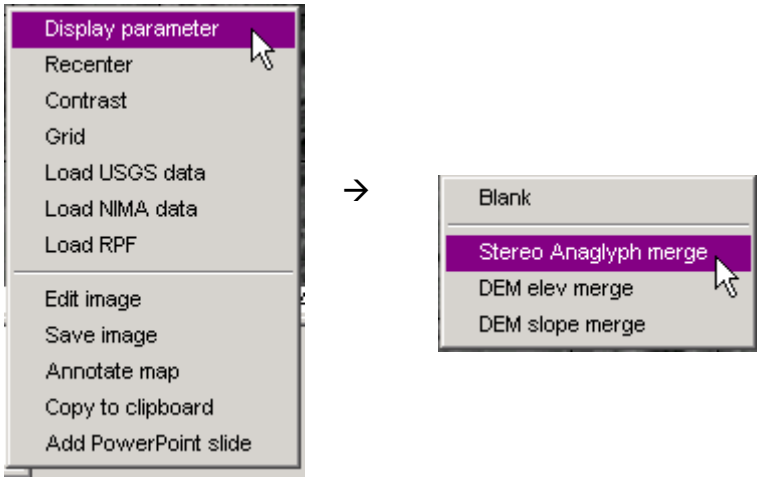


Anaglyph of Imagery Draped over Elevation Data.

You may adjust the vertical exaggeration of your stereo anaglyph by right clicking on your display to bring up the pop-up menu and selecting Anaglyph vert exag. This will bring up the Input Real Number window where you will enter the desired vertical exaggeration value.



To produce a draped stereo view of your image or map data simply right click on your image or map display to bring up the first pop-up menu. Select Display parameter, this will bring up the second pop-up menu.

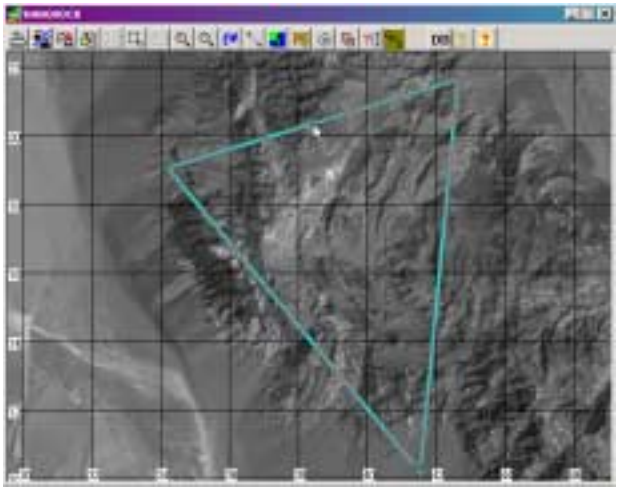


Select Stereo Anaglyph merge to display your image or map as a 3D stereo anaglyph as shown on the previous page.

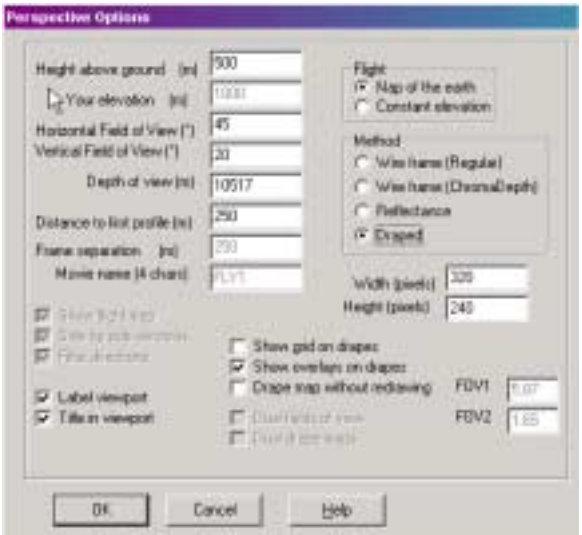
NOTE: Creating stereo anaglyph views of high contrast color displays such as the Elevation Tint is not recommended since the resulting anaglyph may be smeared and difficult to view.

To produce a 3D Perspective View load your elevation data and your image or map data.

Click on the <PERSPECTIVE VIEW> button→ 



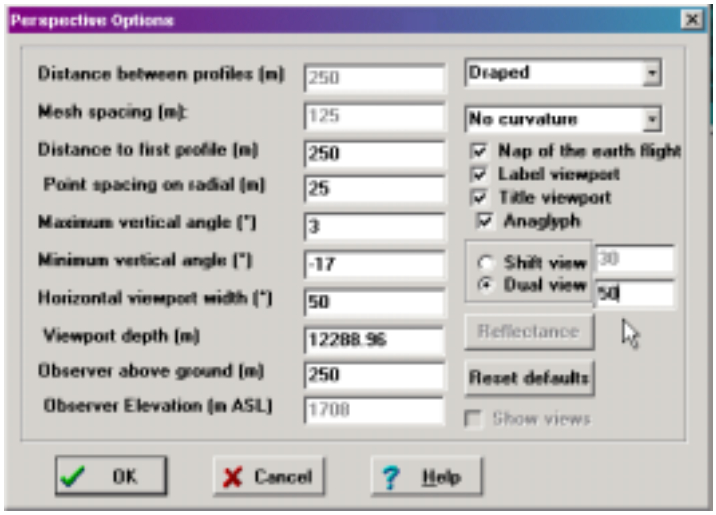
Select the observer's position for your perspective view by double clicking on the image or map display with the mouse. As you move your mouse to the end of your field of view you will notice a reverse-video triangle. This triangle shows the area that will be visible in your perspective view. Double click on the end of your field of view to bring up the Perspective Options window.



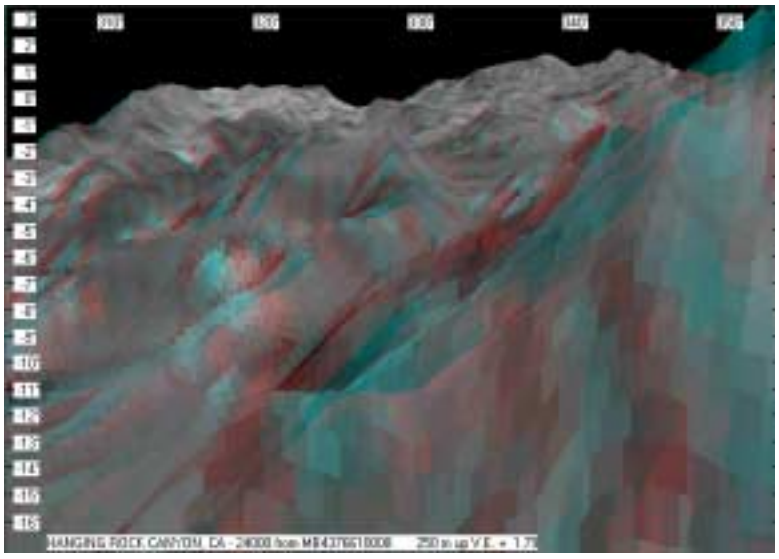
Here you should enter the observer's height above the ground or the observer's elevation above sea level. Selecting Nap of the earth will use the observer's height above the ground. Selecting Constant elevation will use the observer's elevation above sea level. Normally you would select Draped under the Method section. The Width (pixels) and Height (pixels) data entry fields will determine the original size of the perspective view. Don't worry about any of the other settings for now. You can experiment with other settings at your leisure.

NOTE: The Perspective View may be enlarged or reduced in size by simply clicking on the border of the display and dragging to resize the display as you would any other window.

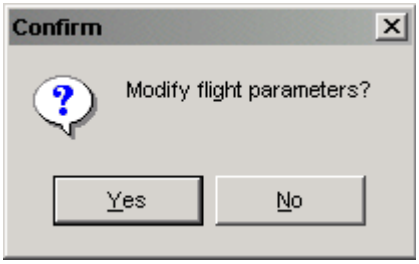
Once the Perspective View is displayed, right click on the display to bring up the second Perspective Options window.



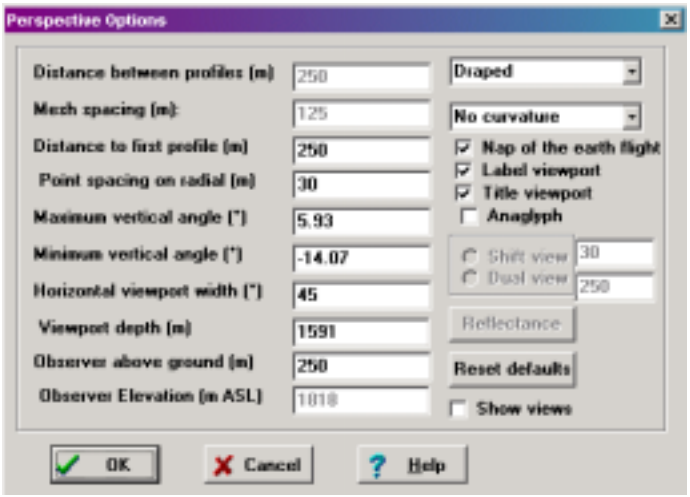
Here you can change a variety of parameters for the view. To enable the stereo anaglyph check the Anaglyph box and select either the Shift view or Dual view radio button. The Shift View option produces a quick perspective view without parallax. The Dual View option produces a more accurate perspective view with parallax. If you select the Dual view you will need to reduce the default value from 250. I usually use a value of about 50 but you may find that some other value suites you better. The correct value depends on the scale of the DEM used.



3D Movies are created using the same methodology. Once you've started generating the individual frames of your movie simply click on the <Abort processing > button on the Drawing Perspective n/n pop-up window. This will bring up the Confirm Modify Flight Parameters pop-up window.

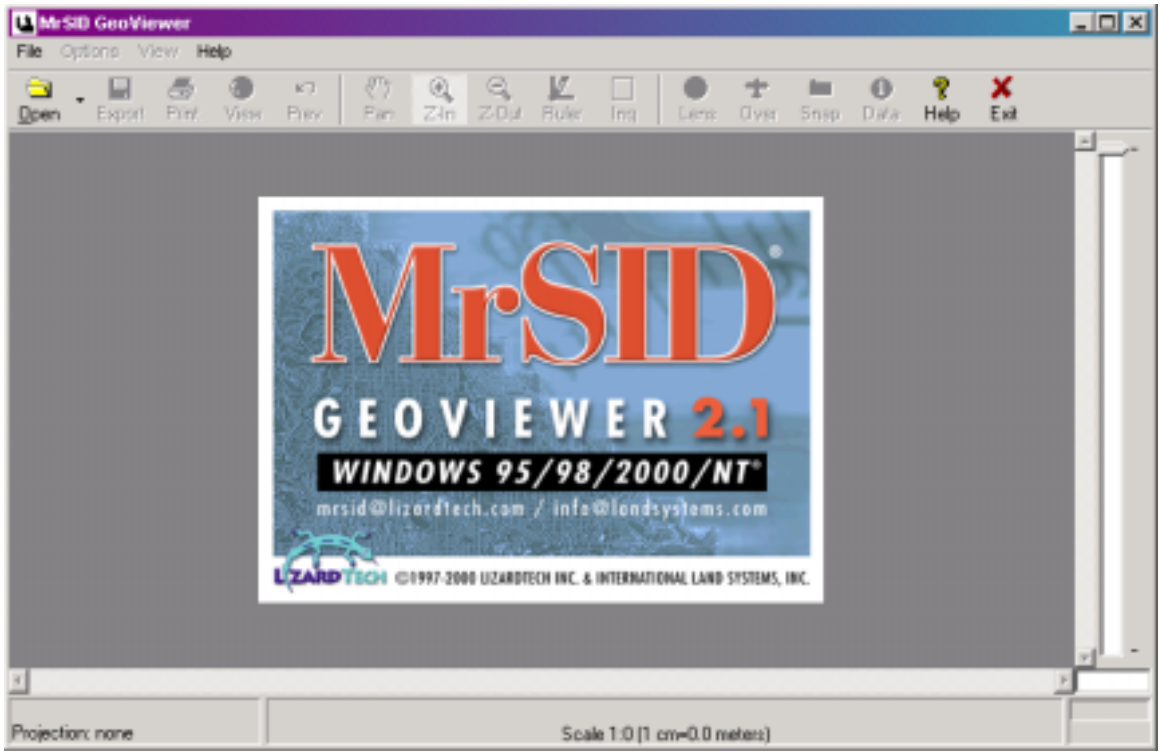


Clicking <YES> on the Modify flight parameters window will bring up the Perspective Options window.



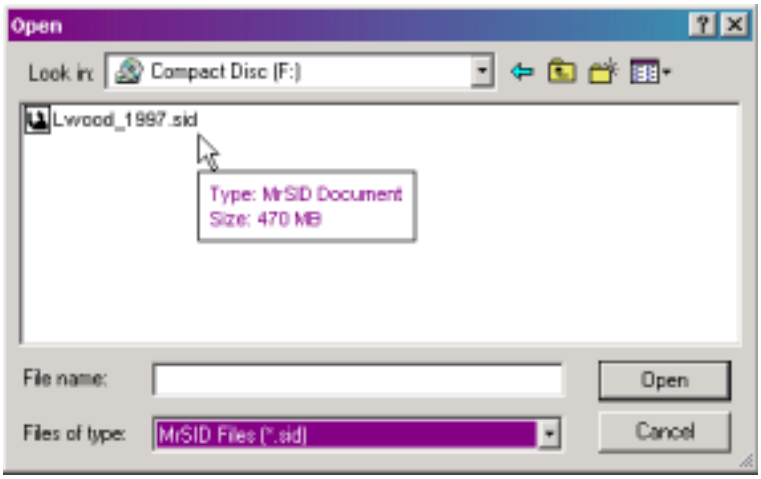
Here you can change a variety of parameters for the view. To enable the stereo anaglyph check the Anaglyph box and select either the Shift view or Dual view radio button. The Shift View option produces a quick perspective view without parallax. The Dual View option produces a more accurate perspective view with parallax. If you select the Dual view you will need to reduce the default value from 250. I usually use a value of about 50 but you may find that some other value suites you better.

Export Geotifs from MrSID Viewer for Use in MicroDEM



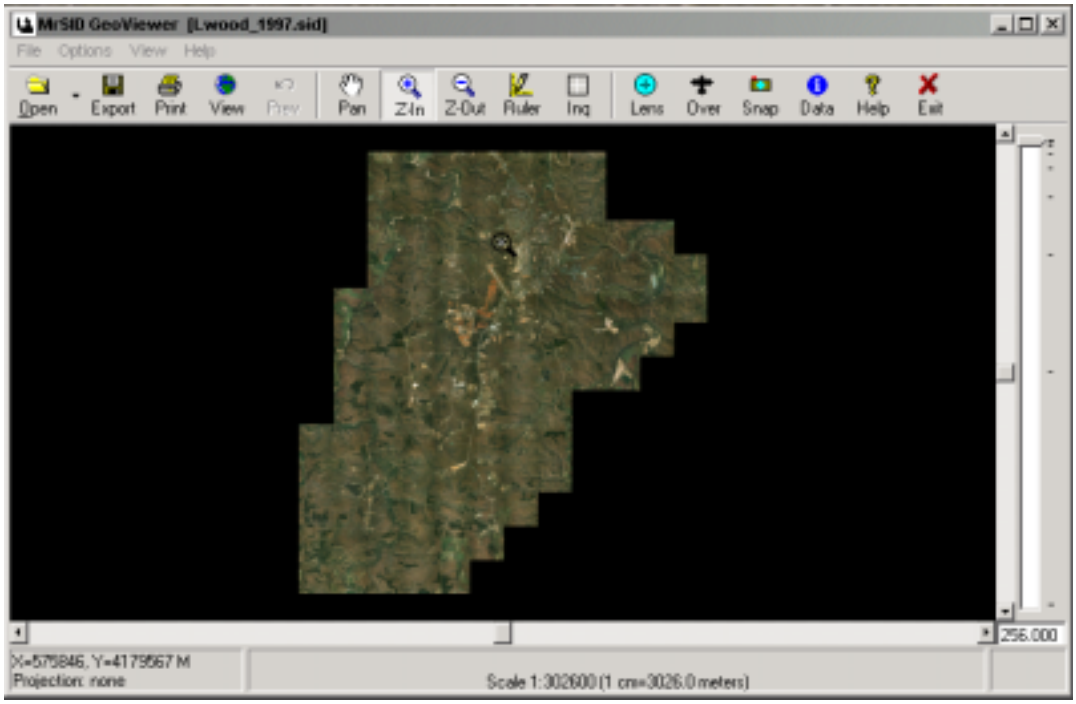
Many military Environmental and Department of Public Works offices will maintain their post image data in MrSID format. MrSID software is useful for small area coverage data storage.

MrSID data is distributed as a high compression (.SID) data file. The entire 10.6Gb FLW data set fits into a single 470Mb MrSID file. The free MrSID Viewer and GeoViewer use on-the-fly decompression to allow the user to view and extract segments of the image as geo-referenced Geotiff image files. These (.TIF) files with/without their associated (.TFW) world file contain the geo-coordinates necessary to use the image in industry standard geographic information systems software.

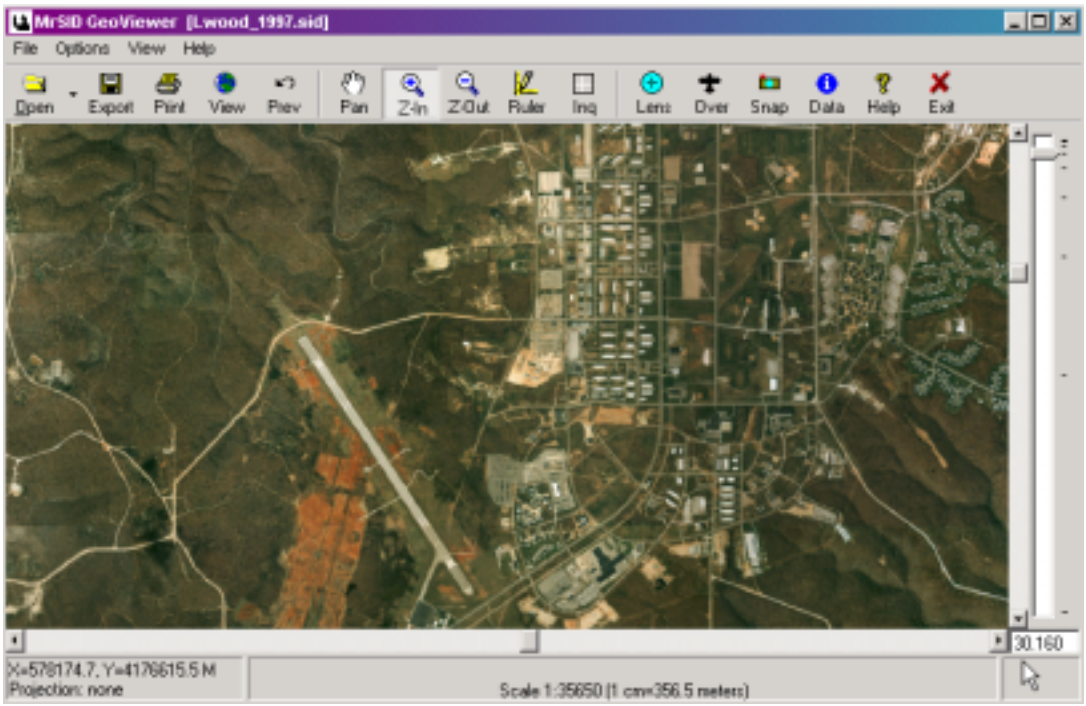


At the MrSid main menu select FILE and OPEN to bring up the OPEN window. Here you will select the desired **.**SID file for your area of interest. Once selected the image for the entire data set will be displayed in the viewer.

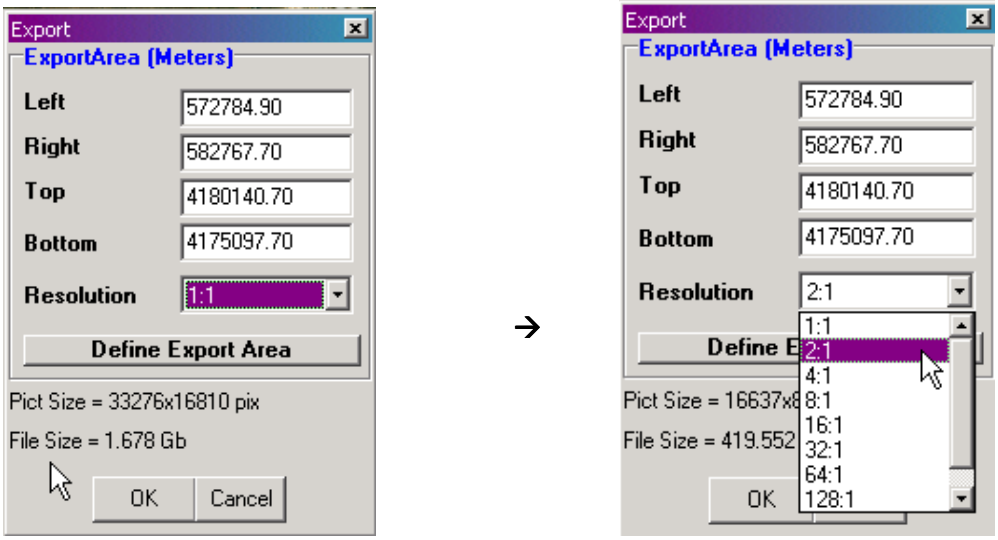
Using the <Zoom In> button → 



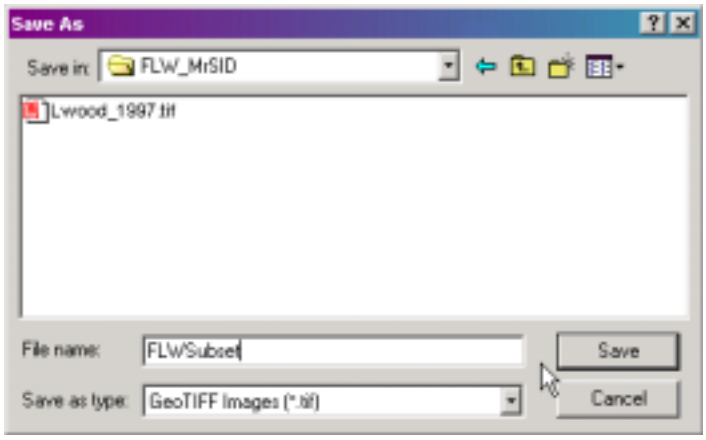
Click on the northwest corner of your AOI and drag to the southeast corner before releasing. Your selected area will be redisplayed on-the-fly.



Note the zoom ratio displayed at the lower right corner of your MrSID display. This is the ratio of pixels available in the image to those currently displayed. Once you have the area you wish to export displayed go to the main menu and select FILE and EXPORT. This will bring up the Export window.



Here you can correct the area you want to export via keyboard entry of corner coordinates, if necessary. Here you will select the Resolution of the exported data by selecting the thinning ratio from the list. NOTE that for the area we've selected a 1:1 export will create a 1.67Gb file while a 2:1 export will produce a 419Mb file. After you have identified the area and the resolution of the data to be exported click on the <OK> button.



This will bring up the Save As window where you will navigate to the location on your hard drive and type the name under which you wish to save the exported data.

Once exported, the data may be used in MicroDEM as you would any other standard imagery file by selecting FILE / OPEN IMAGE at the main menu or by clicking on the <Open Image>

Button. → 

Data Manipulation: Creating new NITF A.TOC Files

If you have received a NIMA CADRG or CIB CDROM with a bad A.TOC file, if you want to create a new data subset or if you wish to combine parts of two or more CDROMs with the same type of data and provide a new A.TOC file to access the merged data sets you may do so as follows. Within MICRODEM, using the local NIMA data base will provide more options and an easier to use interface.

NOTE: You must have copied your RPF directory and all subdirectories to your hard drive to perform this function. After you have created your new A.TOC file you may cut the whole data set to a CDR.

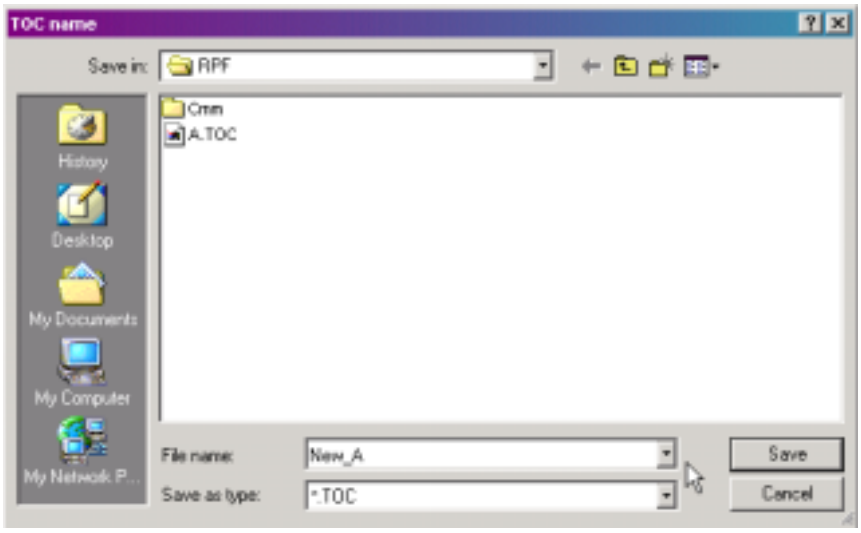
Click on the <In-Out> button → 

This will bring up the Data Manipulation for MICRODEM/TerraBase II window.
Here you will select Create and Create RPF TOC from the menu.

Correct Highlight of RPF directory.

Incorrect selection of RPF directory.

This will bring up the Directory for RPF frames window where you will navigate to the location of the RPF directory under which you have placed all the subdirectories containing NITF data files. NOTE: Here you must highlight but NOT open the RPF directory.



If you have properly selected your RPF directory and if all the directories below it contain only the same type of NITF data (CADRG or CIB) then a message will appear indicating how many frame files were found. At this point your new A.TOC has been created.

If you have improperly laid out your directory structure or if you have misidentified the proper RPF directory you will receive the error message “No RPF frames found in …”.

NOTE: The new A.TOC file you’ve just created contains the path to your RPF frame files relative to the location of the RPF directory itself; therefore, all the data contained in the RPF directory is fully portable and may be passed to other users.

Loading and Using the USGS and NIMA Gazetteer

The Gazetteer allows you to search for a feature name and then to display the related elevation, imagery or map data covering your area of interest. NIMA data files must have been previously imported into the NIMA DataBase as described in Chapter 2 Loading and Displaying Data with the NIMA Database..
USGS data files must have been previously imported into the USGS DataBase as described in Chapter .

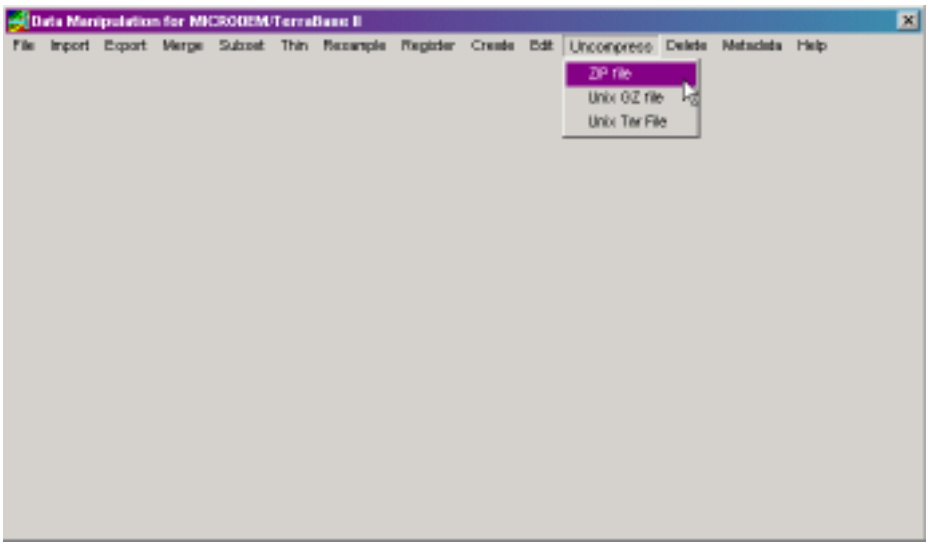
You may download the individual state USGS Gazetteer files from:
http://geonames.usgs.gov
You may download the individual country NIMA Gazetteer files from:
http://164.214.2.59/gns/html/index.html

NIMA DTED Level 1 CDROMs will usually have a Gazetteer subdirectory containing country specific files with .GAZ extensions.

Download or copy the files to your ..\Mapdata\Gazetteer directory and uncompress them, if necessary, using Winzip or one of the decompression utilities available in MicroDEM in the Data Manipulation menu.

Click on the <In-Out> button → 

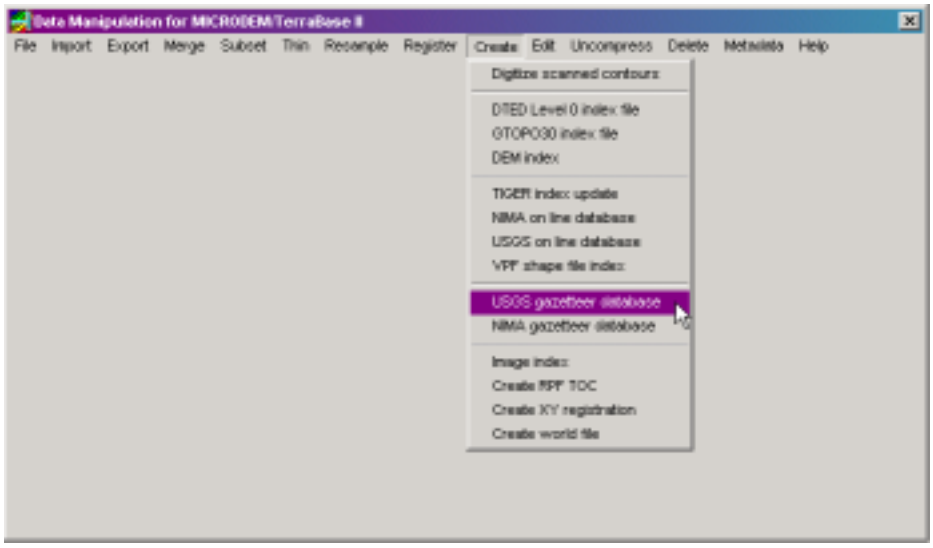
to bring up the data manipulation window.



NOTE: Once you have decompressed your USGS files they will have a _DECI file name ending but no extension. NIMA gazetteer files have a .TXT file extension.

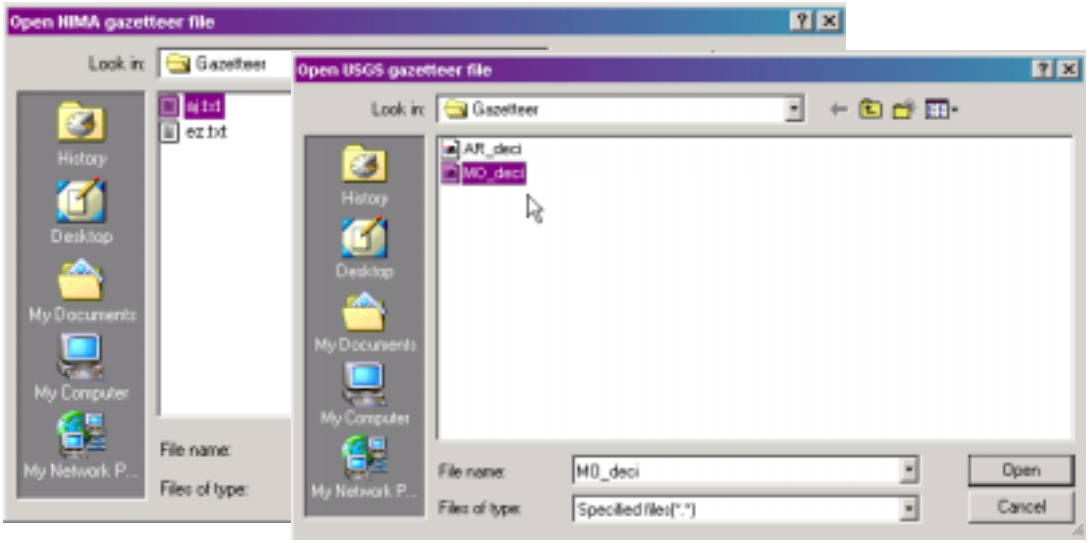
Click on the <In-Out> button → 

to bring up the Data Manipulation for MicroDEM/ TerraBase II window.



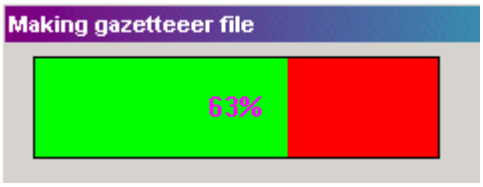
In order to use your newly downloaded gazetteer files you must update your gazetteer index files. Select NIMA gazetteer database to update your NIMA gazetteer. Your NIMA gazetteer files will have either a .TXT or .GAZ file extension. Select USGS gazetteer database to update your USGS gazetteer. Your USGS gazetteer files names will end in _DECI.

This will bring up either the Open NIMA gazetteer file window or the Open USGS gazetteer file window as shown below.



Select the desired country or state gazetteer file to load and search then click on the <Open> button → 

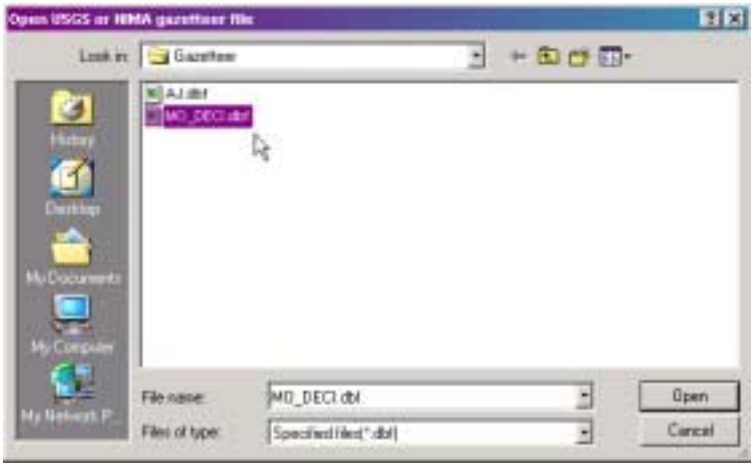
While the file is being process a Making gazetteer file progress bar will be displayed.



Close the Data Manipulation for MicroDEM/TerraBase II window by clicking on the <X> button located at the top right corner of the window.

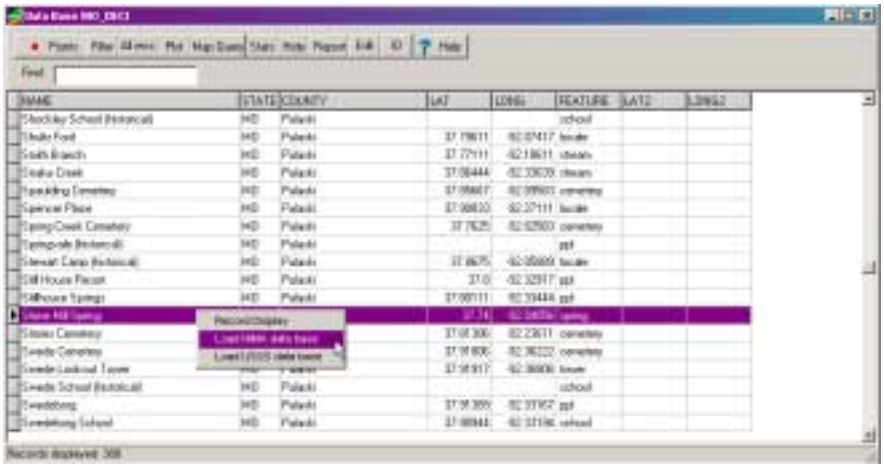
Access the Gazetteer by clicking on the <GAZ> button → 

to bring up the Open USGS or NIMA gazetteer file window.



Select the desired country or state gazetteer file and click on the <Open> button → 

This will bring up the Data Base window for the file you have chosen as shown below.

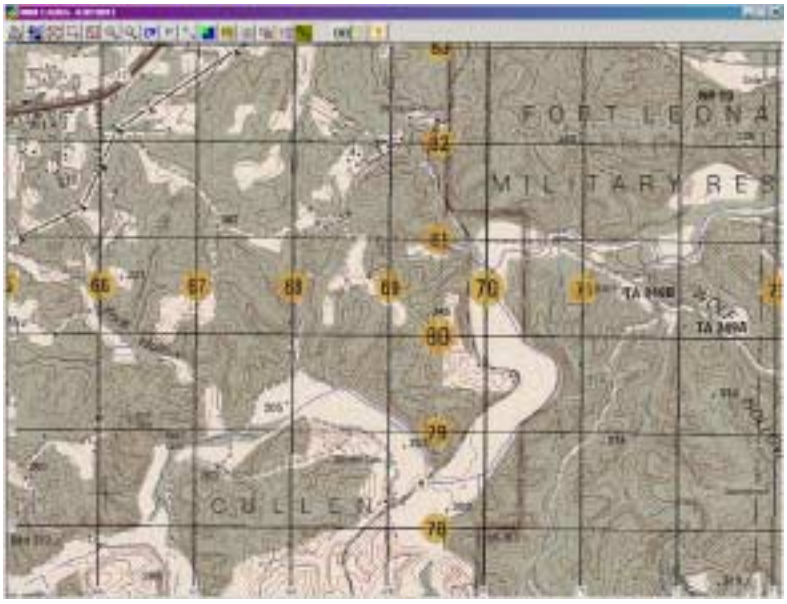


You may manually highlight the desired record, use the FILTER function as previously outlined, or start typing in the Find edit box to locate the name of the desired record you wish to display. Here I have selected the Stone Mill Spring trout fishing site on Fort Leonard Wood.
Double click on the desired record to bring up the popup menu and select either Load NIMA database or Load USGS database.

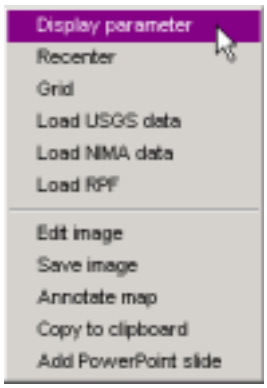
The elevation, imagery and map data which contain the area of interest for your Gazetteer database selection will be displayed. Remember that this data must have previously been imported into your NIMA DataBase and/or USGS DataBase.

2D Shaded Relief Maps

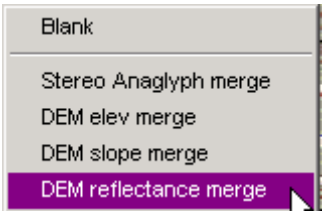
You may create a pseudo 3D merge of your elevation data shaded-relief and your map display to produce a Shaded Relief Map. First load the elevation data for your AOI. Next load the map data for your AOI.



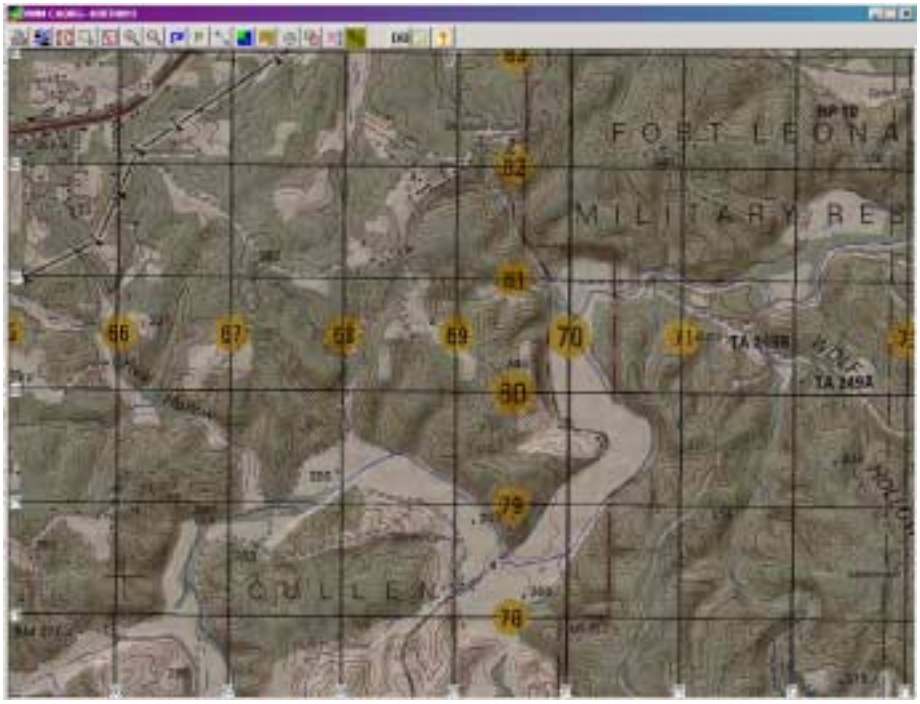
Right click on your map display to bring up the popup menu.



Select Display parameter from the menu to bring up the next popup menu.

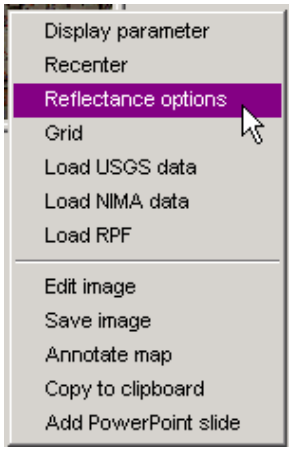


Select DEM reflectance merge from the popup menu.

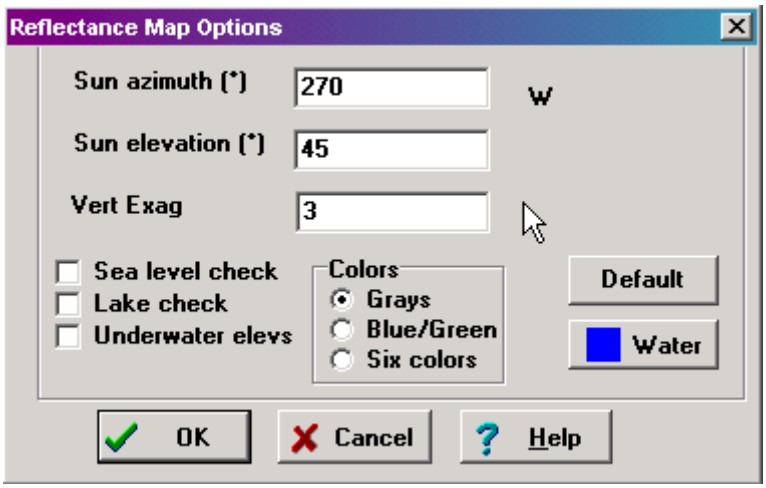


The resulting map display emphasizes the relief through shadows from apparent lighting.

You may alter the azimuth and elevation of the light source as well as the vertical exaggeration by right clicking on your map display to bring up the popup menu and selecting Reflectance Options.



This will bring up the Reflectance Map Options window.



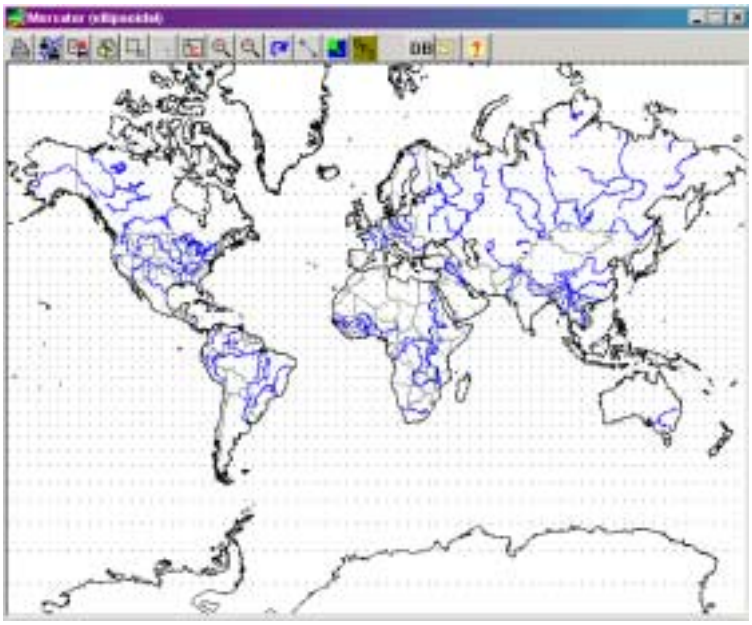
Once you have made your changes to the Sun azimuth, Sun elevation and/or Vert Exag data entry field click on the <OK> button to redraw your map display with these changes.

Chapter 6 Vector Data Operations

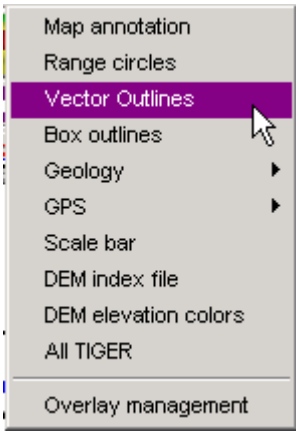
Open an ESRI Shape File

Shape files and their associated database attribute files are a standard non-proprietary GIS format widely used throughout the industry. Commercial ESRI shape files, shape files produced by other software packages such as ERDAS Imagine and those created by MicroDEM may be displayed along with their (.dbf) attribute data in MicroDEM.

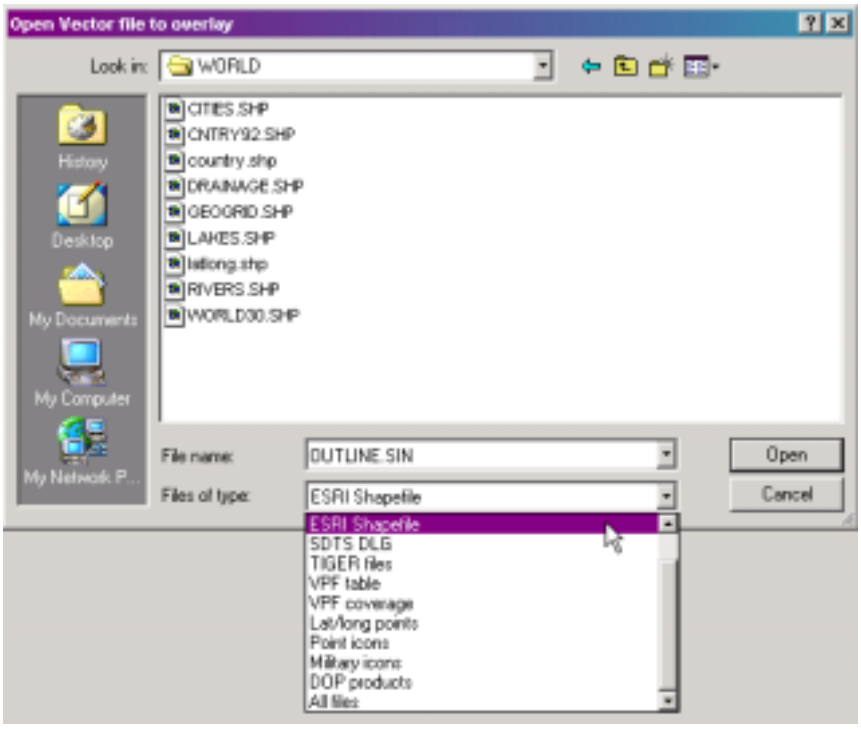
Shape files may be displayed over the World Vector Map, over a blank vector background or over any elevation, imagery or map data. Once you have your background display opened the remainder of the procedure is the same.



At the main menu select OVERLAY and VECTOR OUTLINES.



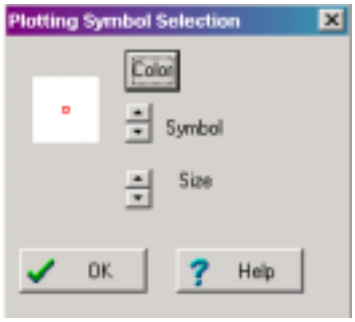
This will bring up the Open Vector File to overlay window.

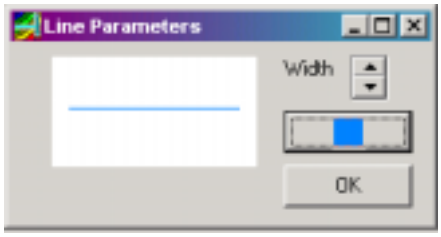


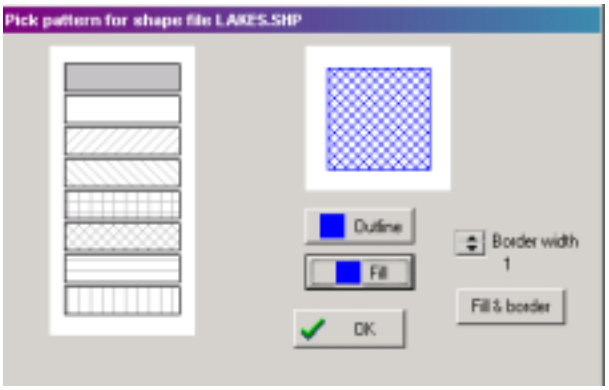
Navigate to the location of your (.SHP) and (.DBF) shape files. Select either ESRI Shapefile or All files from the Files of type: list. If you have selected All files you may see the same file name with as many as seven different files extensions: .avl, .dbf, .prj, .sbn, .shp and .shx. The only important files for use in MicroDEM are the .shx, .shp, and .dbf types. Select the desired .SHP file to be displayed and click on the <OPEN> button. **NOTE:** Entire coverages for Shape files

created from VPF data in MicroDEM may be loaded by selecting their vpf_index.dbf file located with the coverage under the ..\MapData\NimaData\VPF-shapes directory.

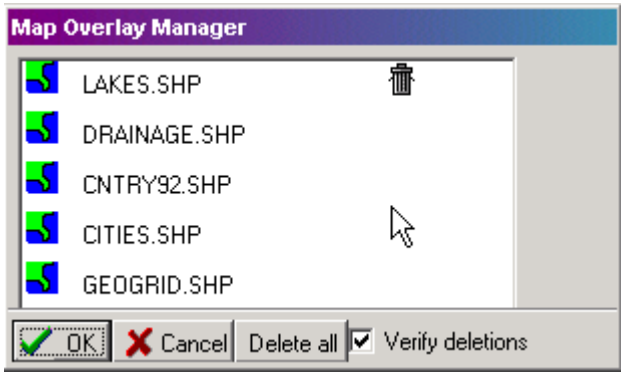
Depending on the type of data file you've selected**:** point, line or area; you will get one of the following windows in which you will select the pattern, symbol, line weight and/or color for your selected feature.







If you manage to obscure an earlier point or line file with an area feature you can manually resort the order of data in your overlay stack by accessing the Map Overlay Manager. At the main menu select OVERLAY and OVERLAY MANAGER to bring up the Map Overlay Manager window.



Simply click on the overlay you wish to move and drag it to a new position in the stack. To delete a single overlay simply click on it and drag it to the trash can at the upper right corner of the manager window.

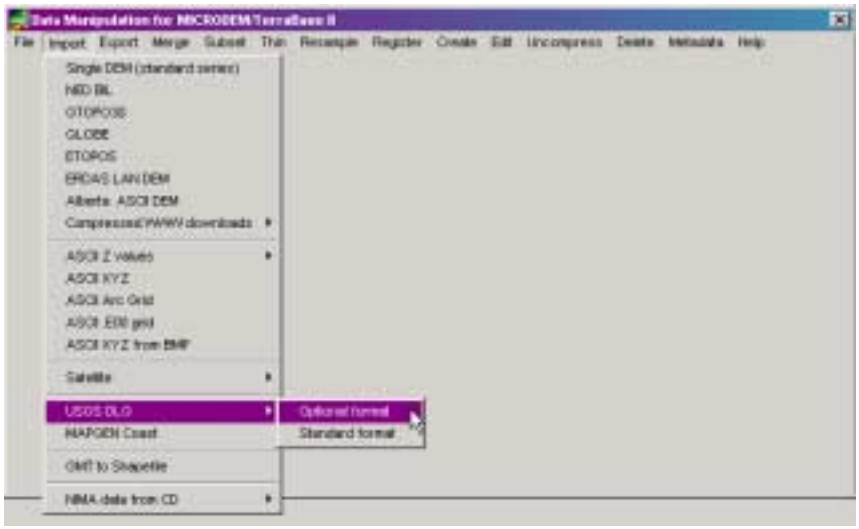
NOTE: If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

Import and Display USGS Digital Line Graphics (DLG) Files

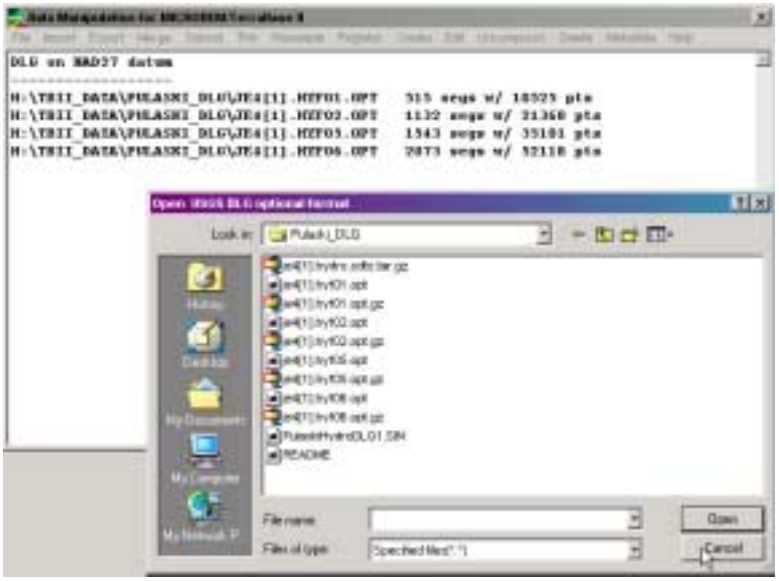
Digital Line Graphics (DLG) files are digital vector data derived from photographic and cartographic sources. Base feature categories include transportation, hydrography and boundaries. DLG data is available in a variety of scales 1:24k, (1:25k, 1:63k for Alaska), 1:100k and 1:2Million. DLG data may be purchased from the U.S. Geological Survey and may often be found for free download at many local universities. DLGs are available in Graphic, Optional, Standard and Spatial Data Transfer Standard (SDTS) formats. MicroDEM is capable of importing both Optional and Standard formats. When downloaded the files are often compressed in a (.GZ) file so you'll first need to use WinZip or the decompression utilities available under MicroDEM's Data Manipulation menu to extract the (.OPT) data file.

Click on the <In-Out> button → 

to bring up the Data Manipulation for MicroDEM/TerraBase II window.



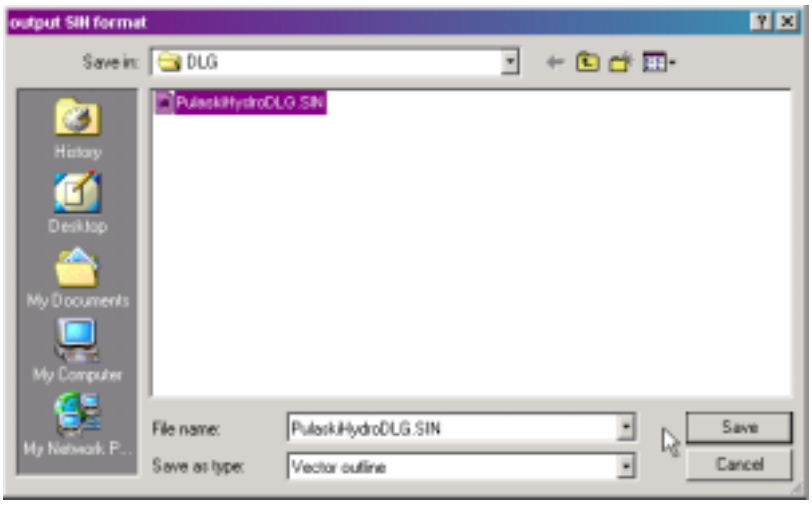
Select the IMPORT/USGS DLS/OPTIONAL FORMAT from the menus. This will bring up the Open USGS DLG Optional format window .



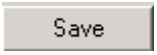
Here you will navigate to the location and select your (.OPT) DLG file. You may have several contiguous data files numbered sequentially as shown above. Select the first file and

click on the <Open> button → 

to bring up the Output SIN format window.



Navigate to the desired output storage location and type a file name to save your imported data to

then click on the <Save> button → 

This will bring up the Open USGS DLG Optional format window again. Notice that the path, file name, number of segments and number of points for each of your selections is listed in the Data Manipulation for MicroDEM/TerraBase II window.

Non-contiguous files, and files for other features should each be imported separately. Contiguous files for the same feature should be loaded together.

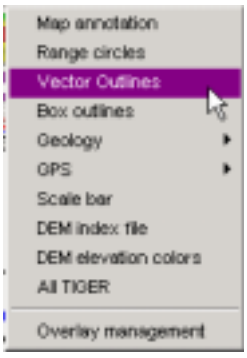
Continue to select the contiguous data files for your feature until you are done then click on the

<Cancel> button → 

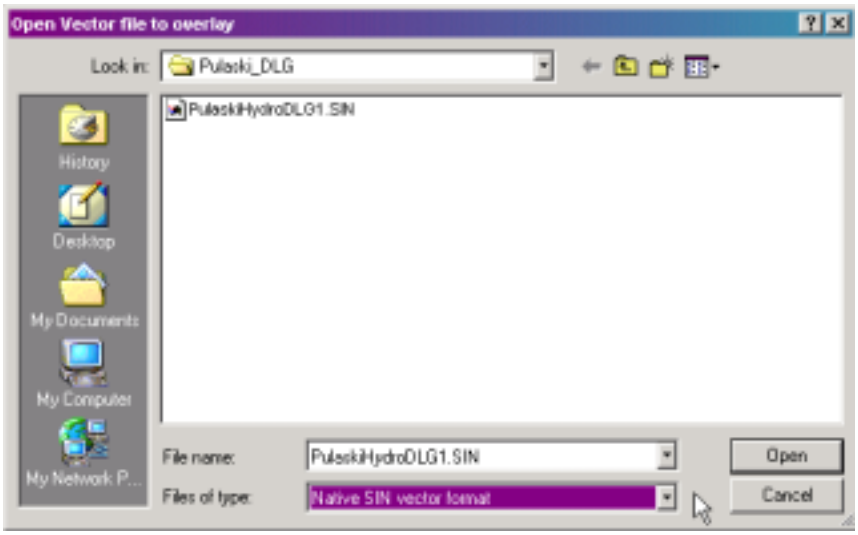
You have successfully imported your data and may now display it. The method for importing Standard format DLG data is the same as that outlined for Optional format data.

Imported DLG, now (.SIN) files may be displayed over the World Vector Map, over a blank vector background, over a blank raster background or over any elevation, imagery or map data. Once you have your background display opened the remainder of the procedure is the same.

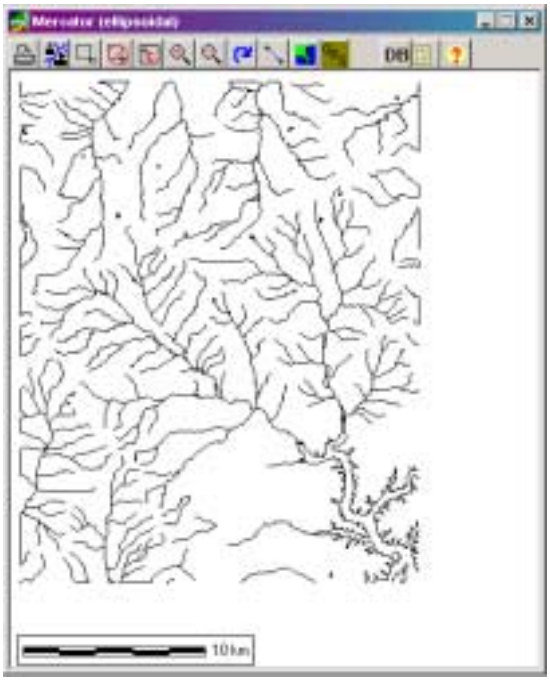
At the main menu select OVERLAY and VECTOR OUTLINES.



This will bring up the Open Vector File to overlay window.



Here you will navigate to the location of your (.SIN) imported DLG files. Be sure and select either Native SIN vector format or All files from the Files of type: list.



If you manage to obscure an earlier point or line file with an area feature you can manually resort the order of data in your overlay stack by accessing the Map Overlay Manager. At the main menu select OVERLAY and OVERLAY MANAGER to bring up the Map Overlay Manager window.

Simply click on the overlay you wish to move and drag it to a new position in the stack. To delete a single overlay simply click on it and drag it to the trash can at the upper right corner of the manager window.

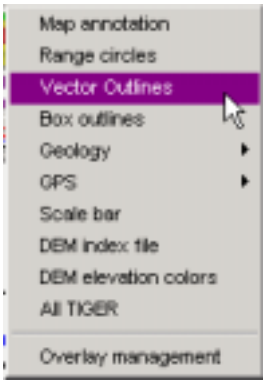
NOTE: If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

US Census Bureau TIGER Files

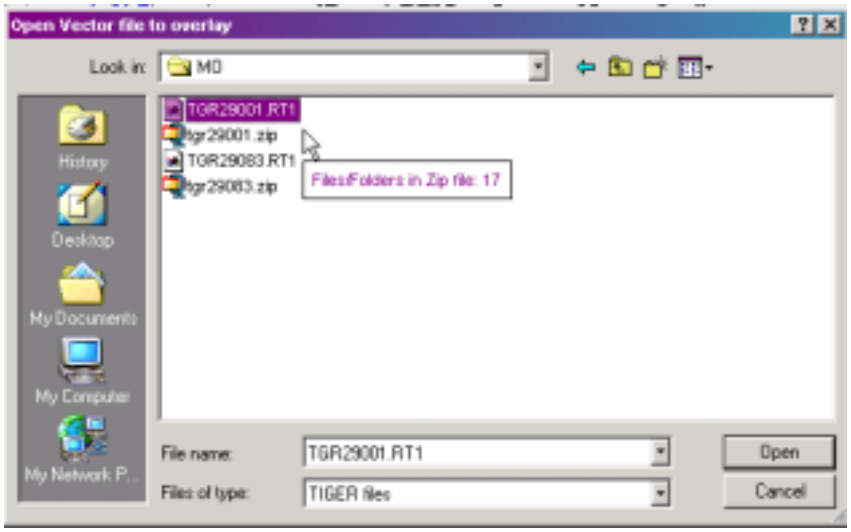
TIGER data is created by the U.S. Census bureau. MicroDEM is capable of displaying the data for the census years 1990, 1997 and 1999.

TIGER data may be displayed over the World Vector Map, over a blank vector background or over any elevation, imagery or map data. Once you have your background display opened the remainder of the procedure is the same.

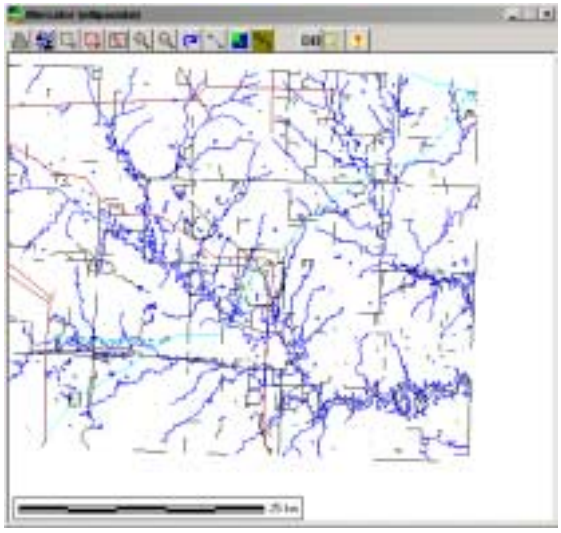
At the main menu select OVERLAY and VECTOR OUTLINES.

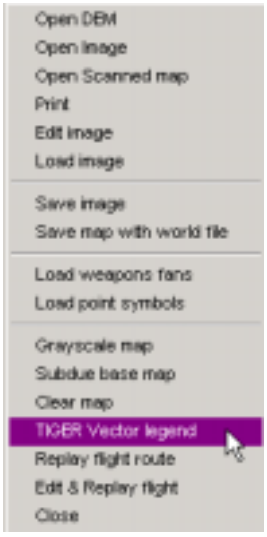


This will bring up the Open Vector File to overlay window.



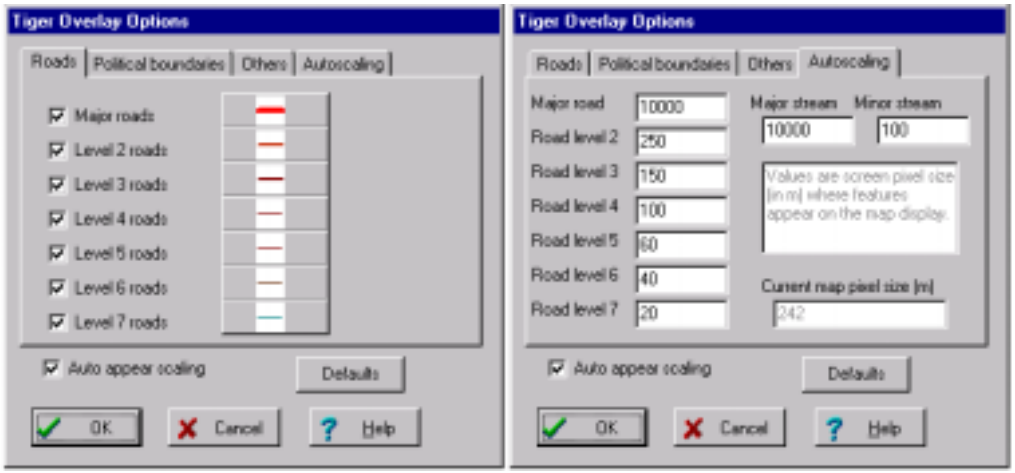
Here you will navigate to the location of your TIGER files. Be sure and select either TIGER Files or All files from the Files of type: list. Select the desired (.RT1) or (.ZIP) file to be displayed and click on the <OPEN> button.





The TIGER data will be displayed over your background map, if any. To bring up the TIGER Legend go to the MicroDEM main menu and select FILE / TIGER VECTOR LEGEND.

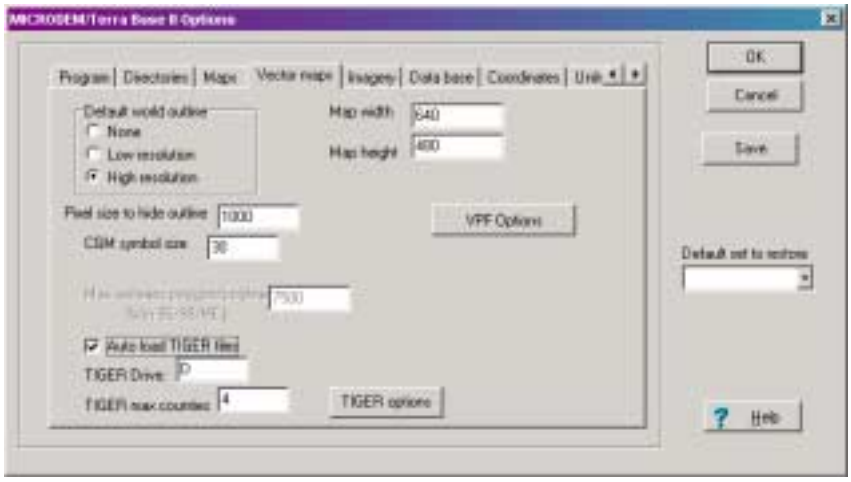
If you wish to change the default plotting options for your data simply right click on the display. The will bring up the Tiger Overlay Options window.



This window allows you to modify the look of your TIGER data. Separate tabs allow you to alter the display of the roads, political boundaries, other features, and the auto-scaling.

The Auto appear scaling checkbox uses "smart" logic to scale the map as you zoom in and out by removing smaller features as the map scale becomes smaller. When auto-scaling is on, roads and streams only appear if the pixel size on the map (in meters) is smaller than the selected thresh-hold value.

The TIGER database and auto-loading of TIGER data may be accessed by going to the main



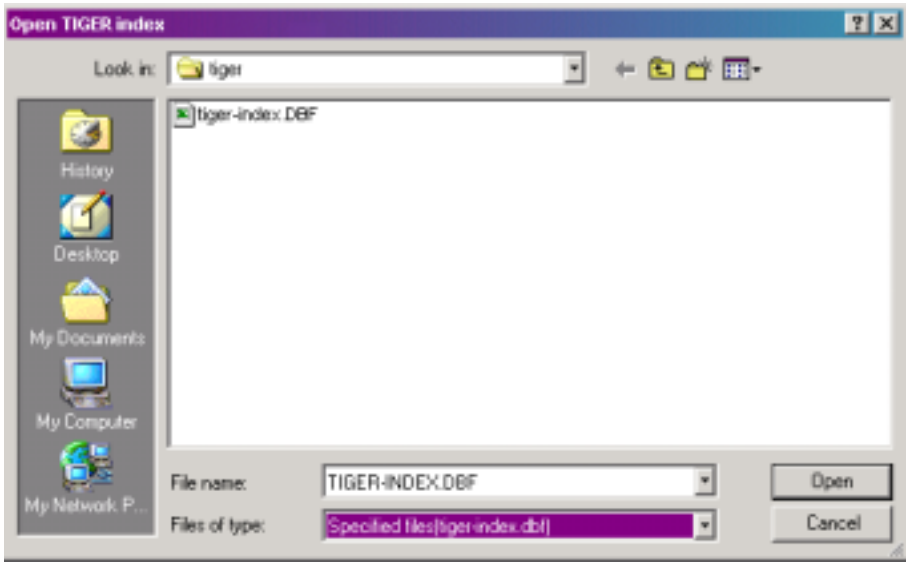
Menu. Select OPTIONS and then select the Vector Maps tab. Here you can set your TIGER data to be automatically loaded when you display other elevation, imagery or map data for the same area by checking the Auto Load TIGER files box.

You may load data into your TIGER database by copying the specific tgrXXXXX.zip files to your ..\Mapdata\Tiger directory. You will need the index for your data to determine the numerical identification for your desired area of interest.

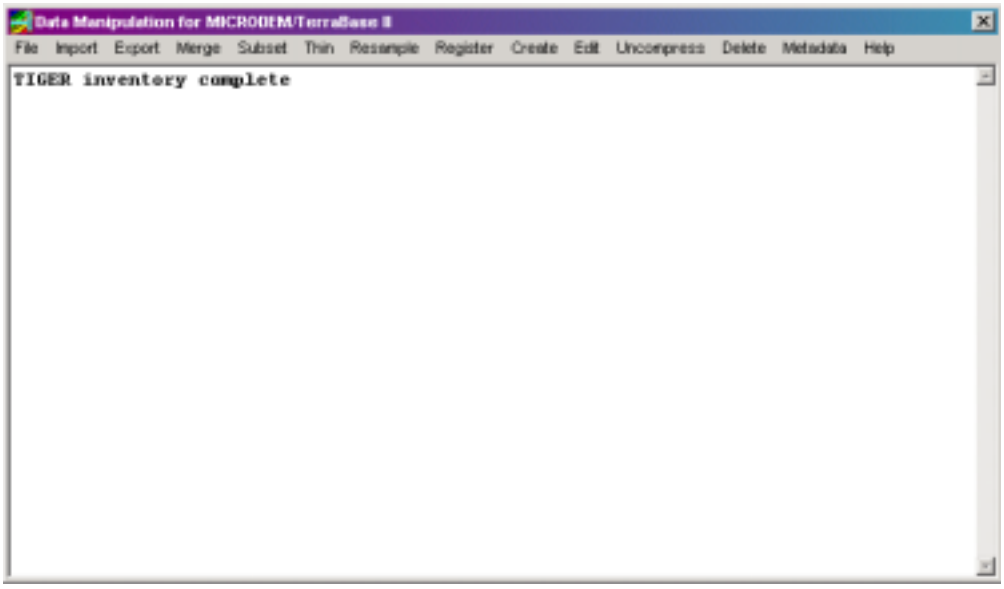
The TIGER index is not part of the standard MICRODEM installation. You can get it from the MICRODEM home page at USNA.

You must update your TIGER Index by clicking on the <In-Out> button → 

to bring up the Data Manipulation for MicroDEM/TerraBase II window.



Select the tiger-index.dbf file and click on the <Open> button → Open to update.



The Data Manipulation for MicroDEM/TerraBase II window will notify you when your index has been successfully updated.

Display of NIMA Vector Product Format (VPF) Data

VPF data may be displayed over the World Vector Map, over a blank vector background, blank raster background or over any elevation, imagery or map data.

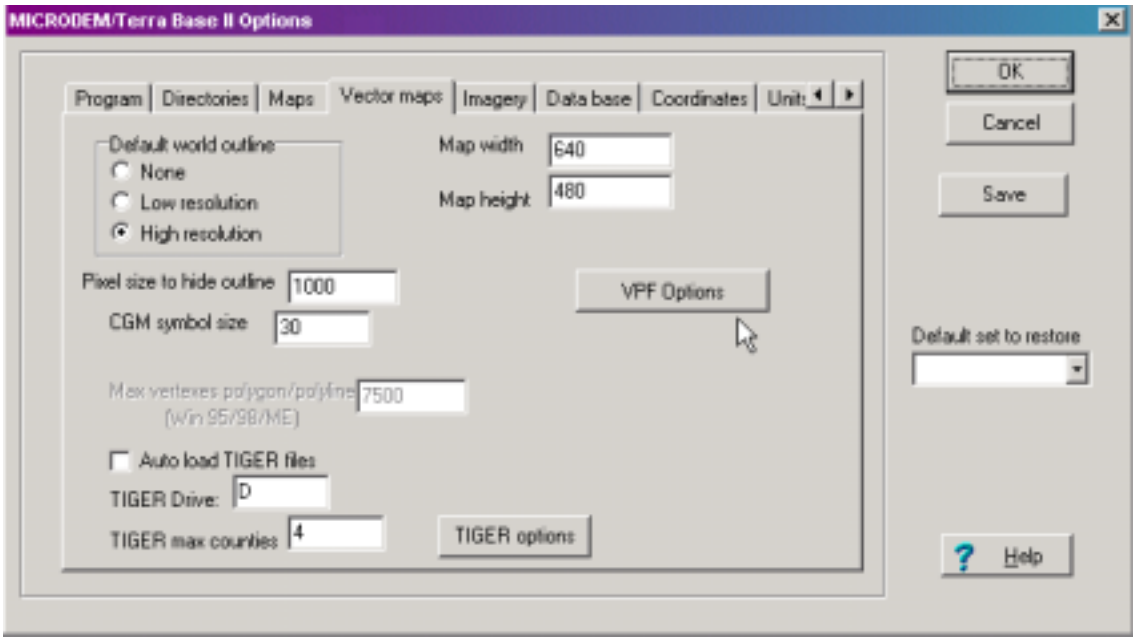
VPF data may be displayed as individual features such as trees and channels via their specific (.PFT),(.LFT) and (.AFT) feature table files or as a complete map set via the (.CAT) catalog file.

- VPF may be displayed using simple map symbology. The advantage of this method is relative speed of display.

- VPF may be displayed using NIMA GeoSym Prototype map symbology. The advantage of this method is its display of map features using the NIMA map symbols. Be warned this is a VERY slow process.

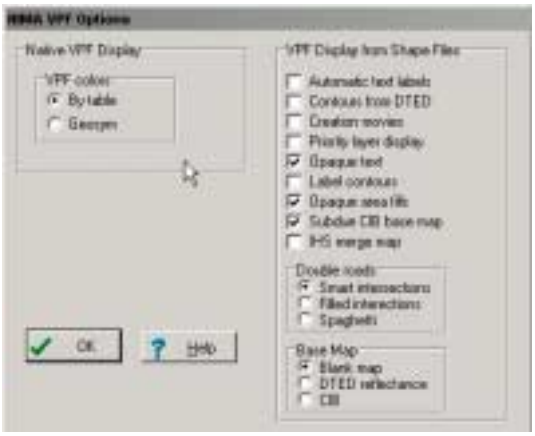
VPF may be converted to shape files and associated database attribute files. Once converted the attribute data may be filtered, searched and queried. The resulting records may be graphically displayed.

The detailed options for display of VPF are selectable in the MicroDEM/Terrabase II Options window.



Select Options from the main menu then select the Vector Maps tab. Click on the <VPF Options> button → 

This will bring up the NIMA VPF Options window.



Here you can elect to display the VPF data using fast, simple symbology by selecting the By table radio button under VPF colors. You may display the data using the slower NIMA Geosym symbology by selecting the Geosym radio button.

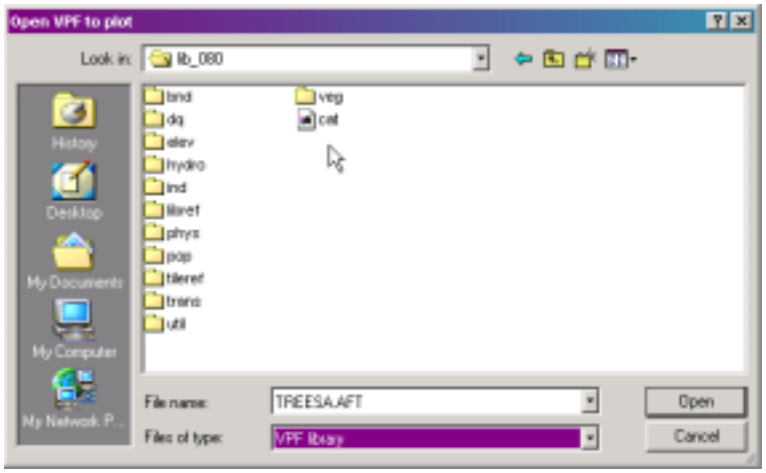
If you select the Blank map radio button from the Base Map section your data will be displayed in a new window. If you select the DTED reflections radio button your VPF data will be displayed over a shaded relief map background. If you select the CIB radio button your data will be displayed over Controlled Image Base background. **NOTE:** You must have the DTED or CIB data for your area of operations pre-imported in your NIMA Database for these last two options to work. See chapter 2 Loading and Displaying Data with the NIMA Database.

Quick Display of VPF Map Data

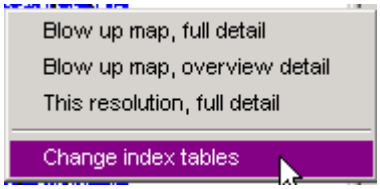
You may quickly display your VPF data with simple symbology by selecting OPTIONS from the main menu, clicking on the Vector Maps tab, clicking on the <VPF Options> button, selecting the By table radio button under VPF colors and selecting Blank map under Base Map. These are the default settings if you selected TerraBase from the Default set to store list, see chapter 1 Setting Options.

To display the VPF data in a new map window click on the <VPF> button → 

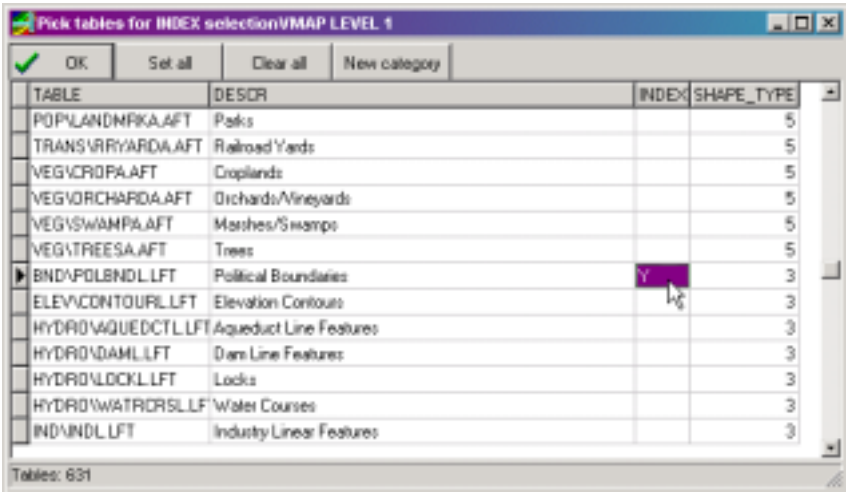
This will bring up the Open VPF to plot window.



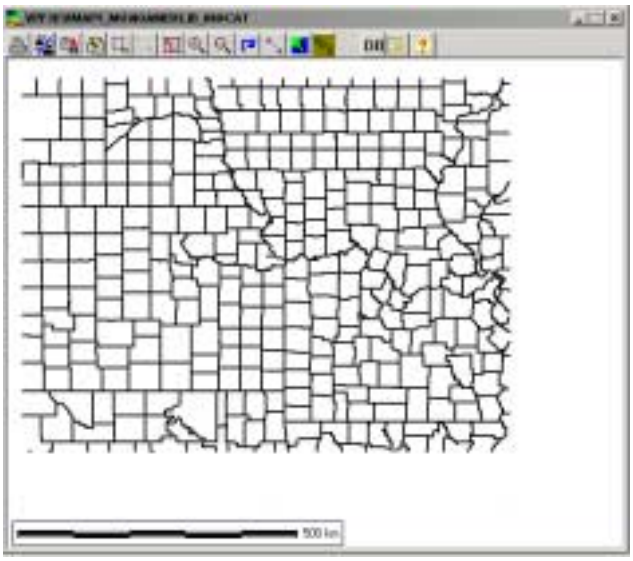
Here you can set Files of Type to VPF Library and then select the .CAT file to display your whole data set. Selected features will now be displayed for your data set and a small popup menu will appear.



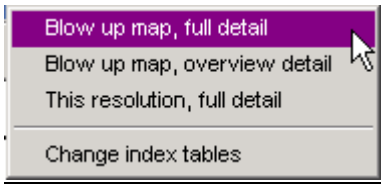
The VPF Pop-up menu will allow you to change the Index Tables. These are the first features to be drawn from your data set. These allow you to determine the extent of your data and allow you to define a subset to be plotted if necessary.



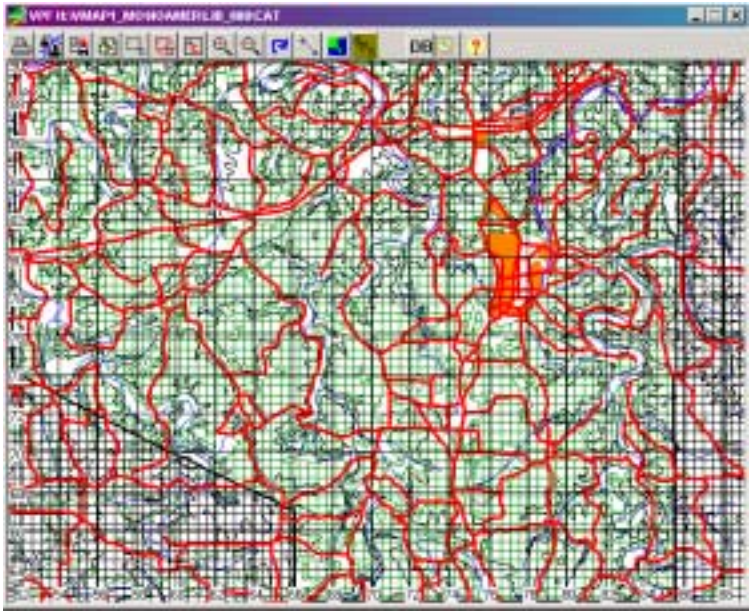
Using your Index Tables double click in the INDEX column to mark the selected feature with/without a 'Y' to display the feature initially. Once selected you will use the index table feature to further define the area you wish to display fully.



Here we have chosen Political Boundaries as our index feature. This is the only feature initially displayed. You will again be offered the VPF Pop-up menu.

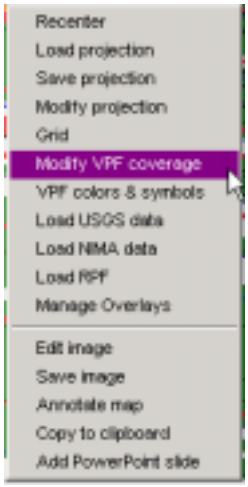


To load the entire data-set select This resolution, full detail from the list. Be aware that this process could take a VERY long time if you have a large data set such as this Vmap 1. To load a selected area of the data select Blow up map, full detail from the list. Click on the North West corner of your area of interest, hold the mouse button down and drag to the South East corner and release. The individual layers/themes will be displayed in the order defined by the specification for that data set.

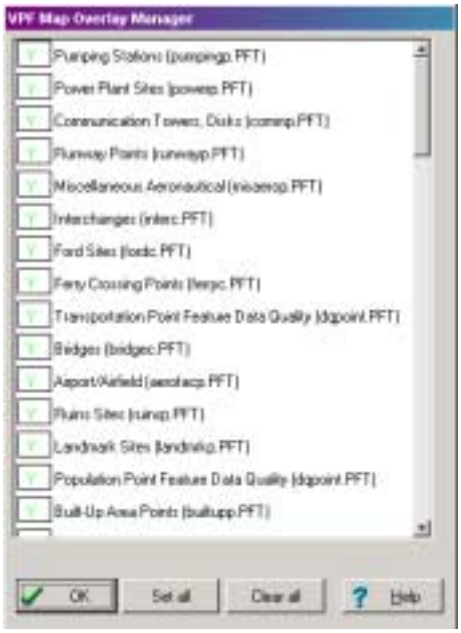


Here I have selected to display only the southern portion of Pulaski County.

You may adjust what specific features, out of the entire data set, are displayed by right clicking on your display and selecting Modify VPF Coverage from the popup menu.



This will bring up the VPF Map Overlay Manager.



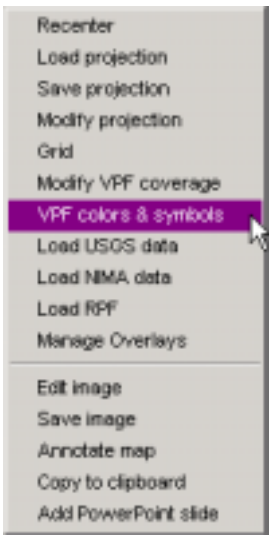
Here can select and deselect what specific features you wish to display by double clicking in each box to toggle back and forth between Y and N. You may also select all features by clicking

on the <Set All> button → 

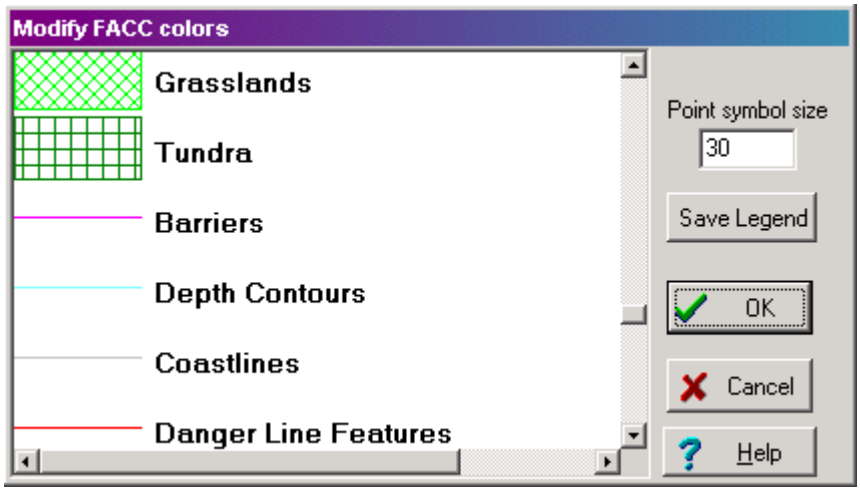
or deselect all features by clicking on the <Clear All> button.→ 

To redraw your display with the selected set of features click on the <OK> button. → 

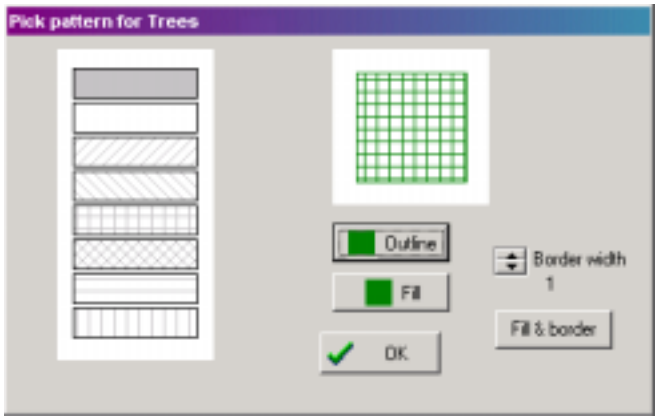
To change the display color or pattern for any given feature right click on your display to bring up the popup menu and select VPF Colors and Symbols from the list.

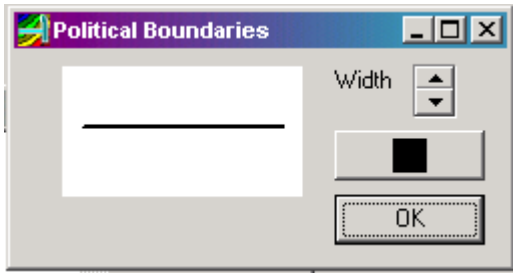


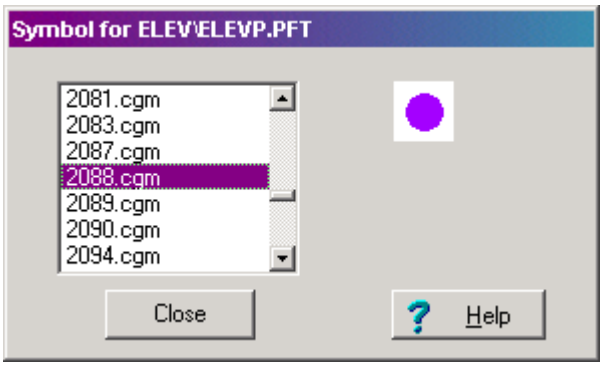
This will bring up the Modify FACC Colors legend.



Here you may double click on the pattern, line or point symbol to bring up its related symbol selection window.







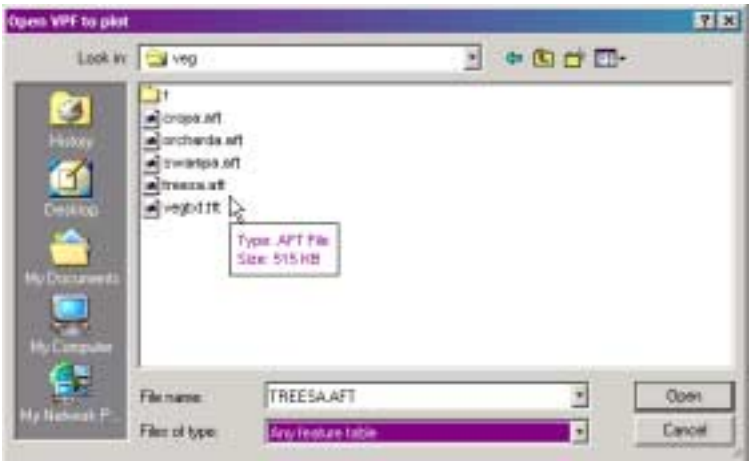
NOTE: When using the fast display by-table method many of the patterns and lines will need to be redefined the first time you use a particular data set. Also many of the point symbols will not have an assigned symbol. You may utilize any .GIF, .BMP or .CGM symbol in your ..\Mapdata\Icons sub-directory for your point symbols.

To display individual features from your VPF data set in a new window click

on the <VPF> button → 

set your Files of Type to Any Feature Table

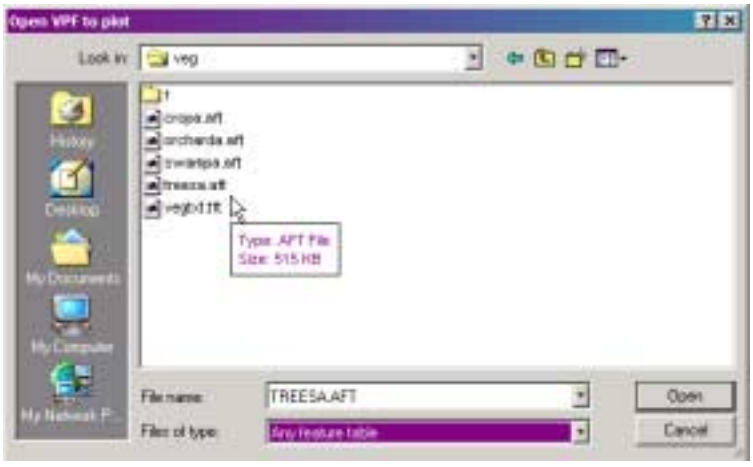
and select the desired .AFT, .LFT or .PFT file from the desired themes subdirectory such as Hydrology, Industry, Population, Transportation et cetera.



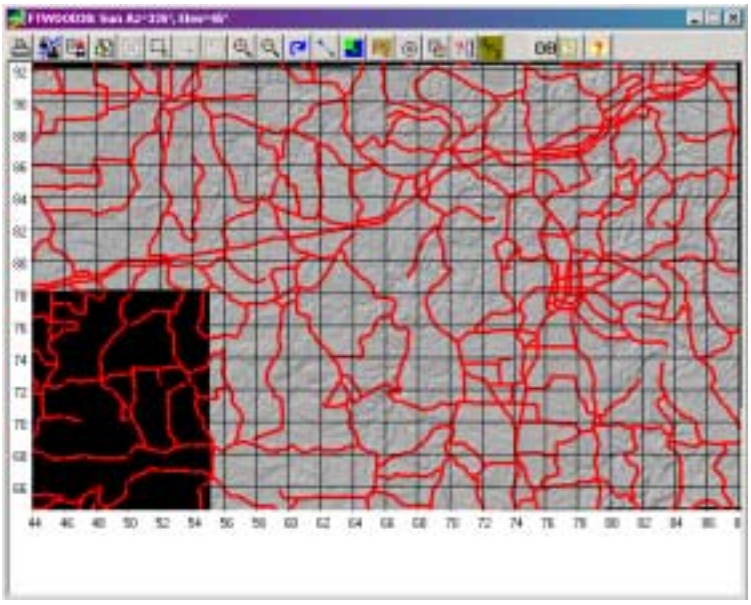
These same procedures for defining index features, selection of area of interest and display properties of VPF data as outlined in the previous section will apply.

Quick Display of Individual VPF Features Over a Map Background

With your current elevation data, imagery or map displayed go to the main menu and select OVERLAY / VECTOR OUTLINES. This will bring up the Open VPF to plot window.

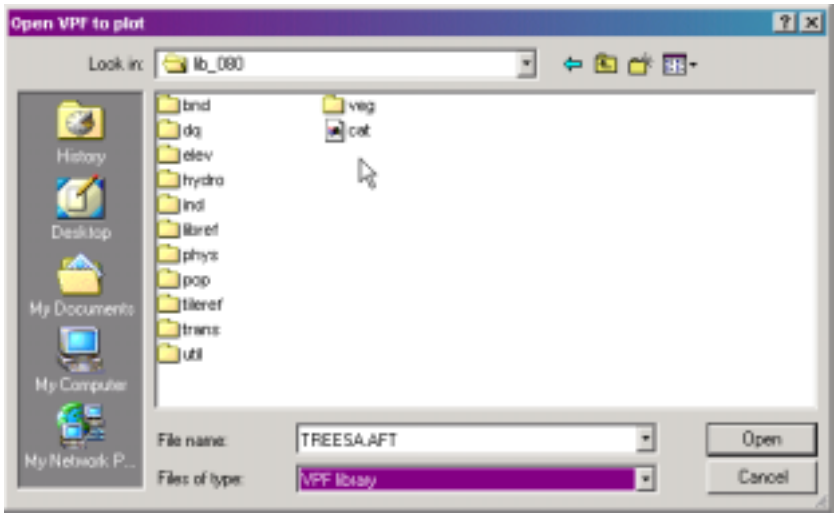


You can set your Files of Type to Any Feature Table and then select the desired .PFT, LFT, or .AFT feature table file to be displayed.



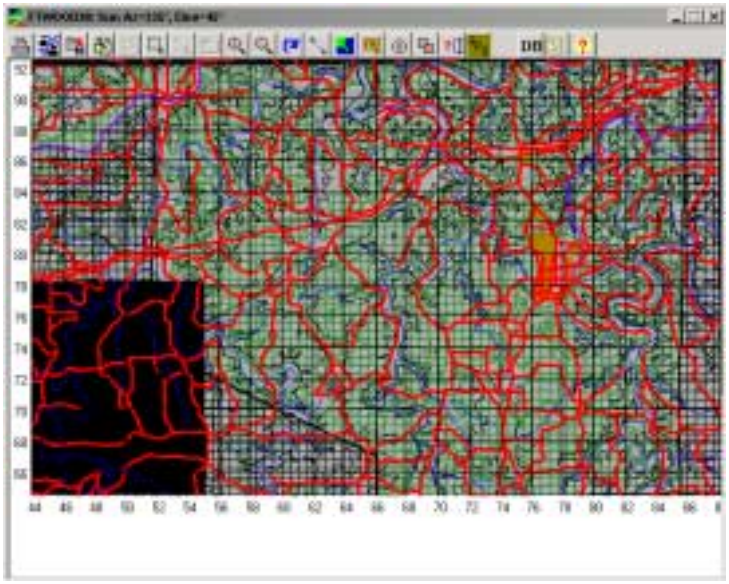
Here we have chosen to display the roads line feature table Roadl.lft.

We can just as easily display our entire VPF data set over our map background by again selecting OVERLAY / VECTOR OUTLINES. This will bring up the Open VPF to plot window.



Set Files of Type to VPF Coverage and then select the (.CAT) catalog file.

The entire data set which covers your current display will be loaded and displayed over your map background.



Here we have displayed the entire Vmap1 data set over our elevation data shaded relief.

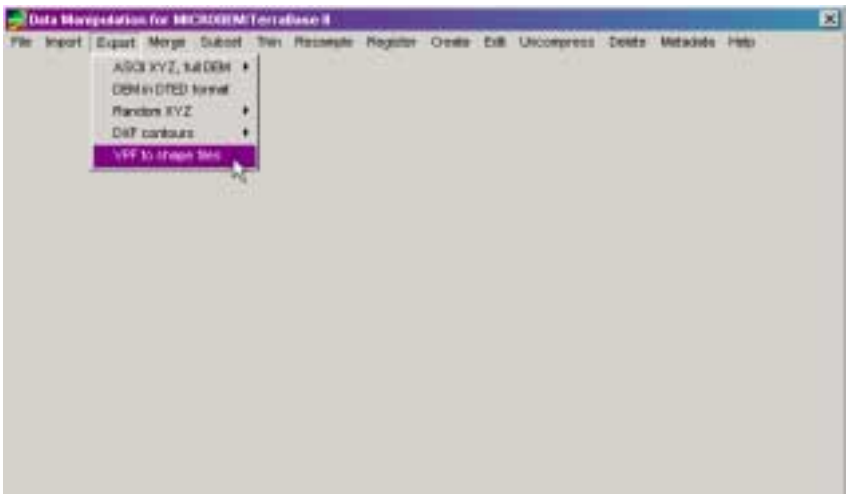
The same procedures for turning on/off themes and display properties of the data as outlined in the previous section will apply.

Exporting VPF Data to Shape and Database File Formats

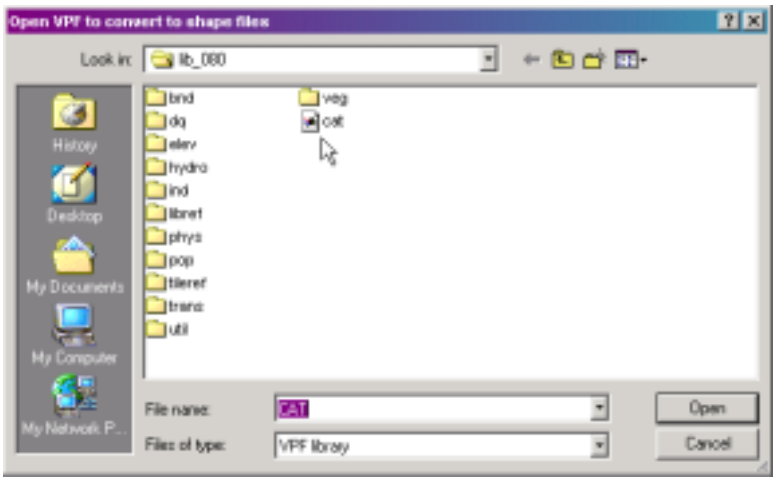
Using the GeoSym display to convert VPF data to Shape and Database file formats is not recommended since this method is extremely slow. You may quickly convert your data using the Data Manipulation menu. Converted database files may be utilized along with the extensive query and ID functions built into MicroDEM for search and analysis of attribute data.

Click on the <IN-OUT> button → 

to bring up the Data Manipulation for MicroDEM/TerraBase II window.

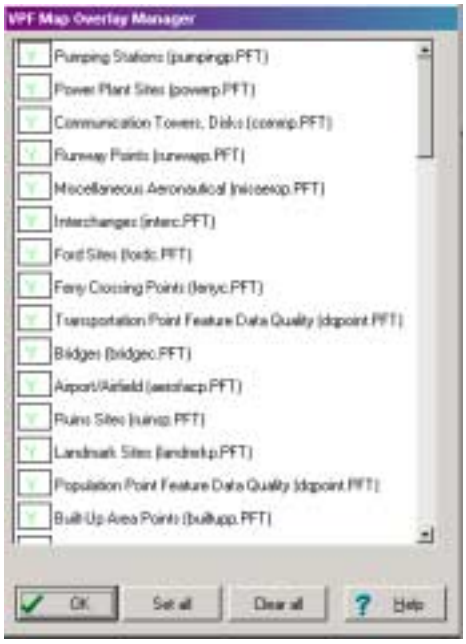


Select Export and VPF to shape files from the menu to bring up the Open VPF to convert to shape files window.

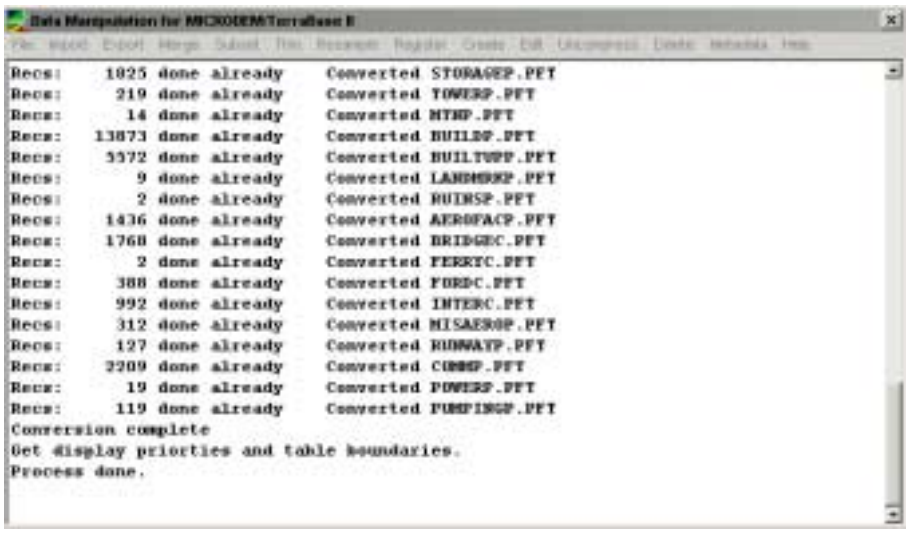


Here you should set your Files of type to VPF library then navigate to and select the (.CAT) file for your VPF coverage. **NOTE:** selecting Files of type: Any feature table, Area feature table, Line feature table or Point feature table will allow you to convert an individual feature table rather than the entire coverage.

This will bring up the VPF Map Overlay Manager window.



Here you may select individual themes to be converted or select Set all to convert all themes for the entire coverage.

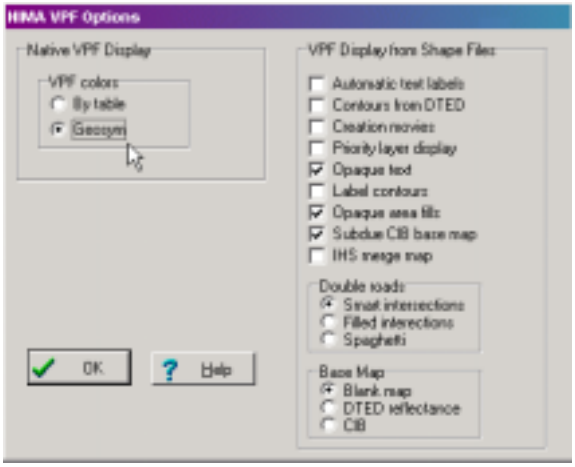


The conversion process is displayed in the Data Manipulation window. When the process is done the readout will display Conversion Complete and Process Done. The converted data will be written to your..\MapData\NimaData\VPF-Shapes directory in a subdirectory related to the specific coverage.

Using GeoSym Map Symbology to Display VPF Data

NOTE: You must be running the Windows NT or 2000 operating systems to utilize GeoSym!

Select Options from the main menu then select the Vector Maps tab. Click on the <VPF Options> button → VPF Options This will bring up the NIMA VPF Options window.

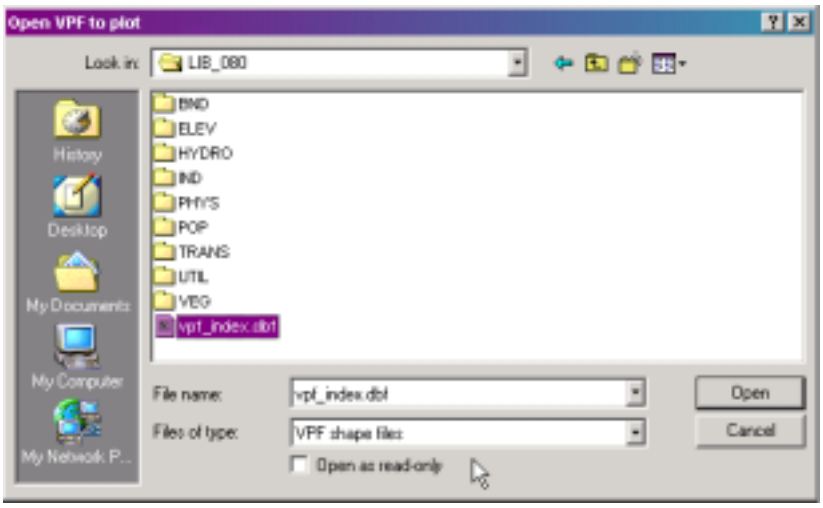


Display the data using the NIMA Geosym symbology by selecting the Geosym radio button under the Native VPF Display section. If you select the Blank map radio button from the Base Map section your data will be displayed in a new window. If you select the DTED reflections radio button your VPF data will be displayed over a shaded relief map background. If you select the CIB radio button your data will be displayed over Controlled Image Base background.

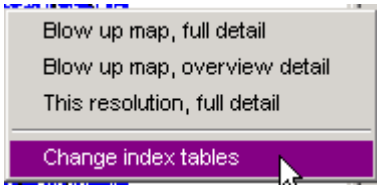
NOTE: You must have the DTED or CIB data for your area of operations pre-imported in your NIMA Database for these last two options to work. See chapter 2 Loading and Displaying Data with the NIMA Database.

To display the VPF data in a new map window click on the <VPF> button → 

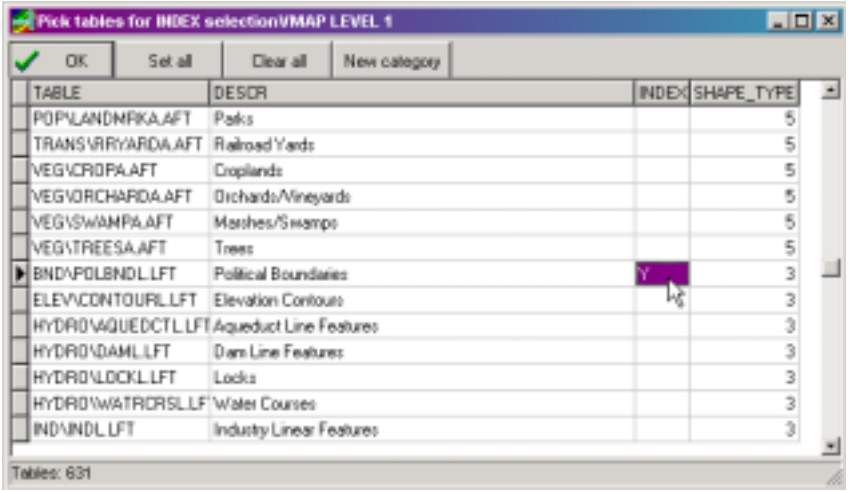
This will bring up the Open VPF to plot window.



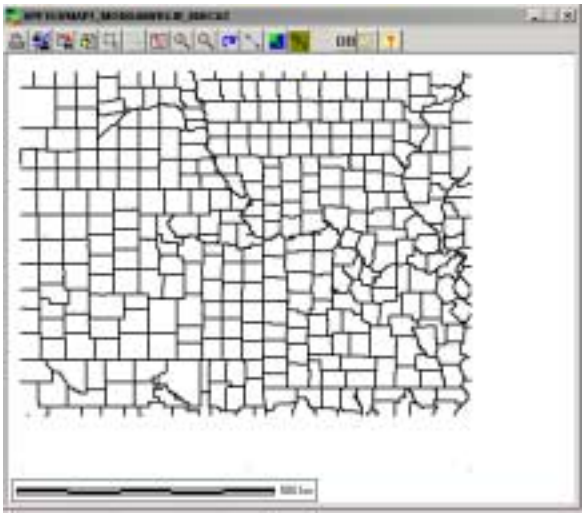
Here you set Files of Type to VPF shape files and then select the VPF_INDEX.DBF file to display your whole data set. Selected index features will now be displayed for your data set and a small popup menu will appear.



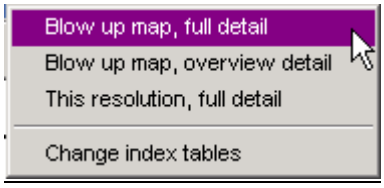
The VPF Pop-up menu will allow you to change the Index Tables. These are the first features to be drawn from your data set. These allow you to determine the extent of your data and allow you to define a subset to be plotted if necessary.



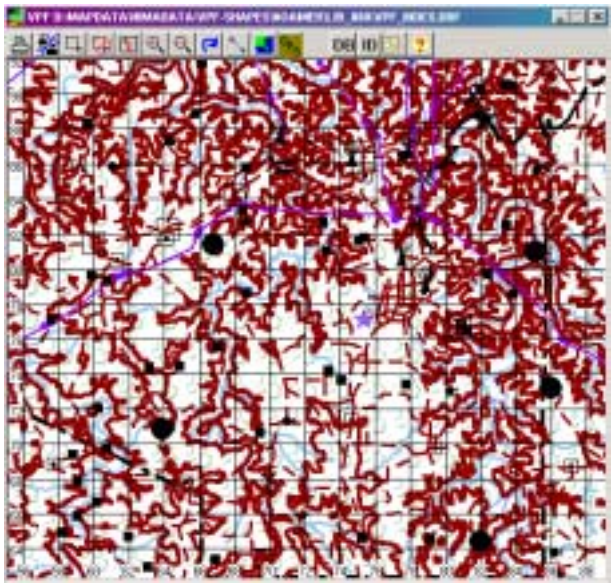
Using your Index Tables double click in the INDEX column to mark the selected feature with/without a 'Y' to display the feature initially. Once selected you will use the index table feature to further define the area you wish to display fully.



Here we have chosen Political Boundaries as our index feature. This is the only feature initially displayed. You will again be offered the VPF Pop-up menu.

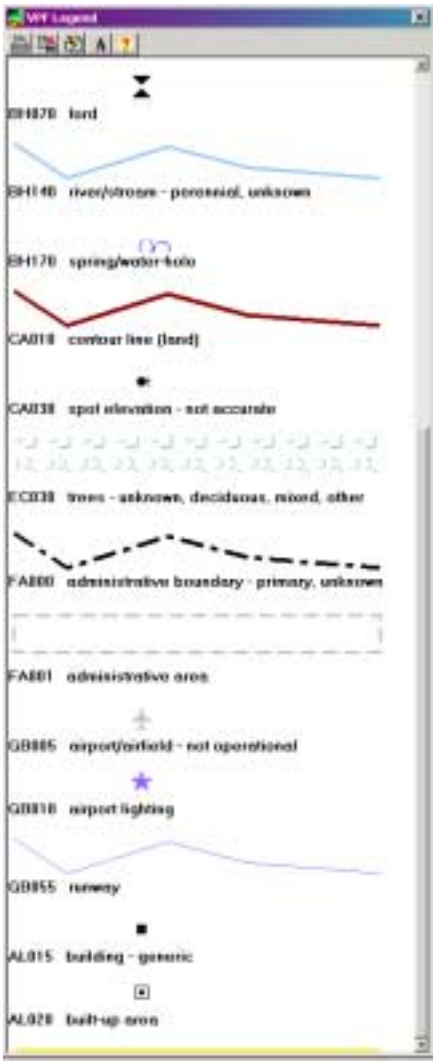


To load the entire data-set select This resolution, full detail from the list. Be aware that this process could take a VERY long time if you have a large data set such as this Vmap 1. To load a selected area of the data select Blow up map, full detail from the list. Click on the North West corner of your area of interest, hold the mouse button down and drag to the South East corner and release. The individual layers/themes will be displayed in the order defined by the specification for that data set.



Here we have displayed the southern half of Pulaski County covering FLW with GeoSym symboloby. The map should be enlarged or subset in order to appear properly.

The GeoSym Legend for your data set is displayed by selecting FILE/VPF LEGEND at the main menu.

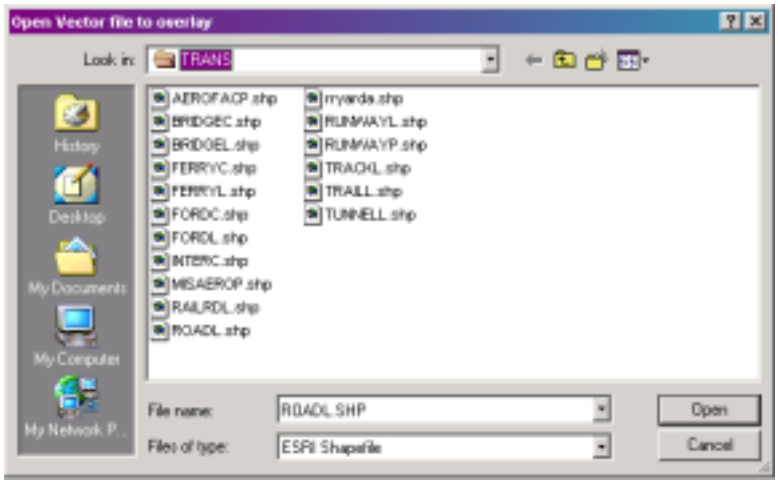


The key differences in displaying your data with Geosym symbology are the following:

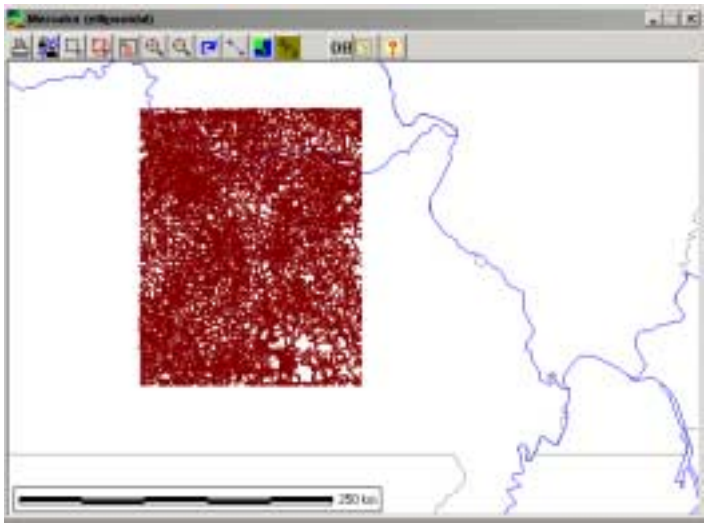
- The data will display more slowly
- The data will be displayed using the **prototype** NIMA Geosym map symbology
- The data must be converted to shapefiles and database files which are stored in your ..\Mapdata\NimaData\VPF-shapes subdirectory. These can be used for standard data base operations.

Database Manipulation and Query

As shown in the previous sections VPF data is converted to shape files and associated database attribute files when you select GeoSym as the Native VPF Display and may be quickly manually exported via the Data Manipulation menu. This is a useful feature even when you are running the Windows 95/98/Millenium operating systems. The individual shape files may be displayed with quick symbology on any Windows operating system. At the main menu select OVERLAY/VECTOR OUTLINES to bring up the Open Vector file to overlay window.

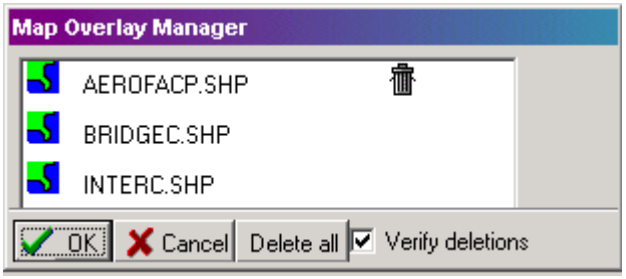


Set your Files of type to ESRI Shapefile, navigate to the desired theme subdirectory such as TRANSportation and select the specific shapefile to display.



Here I have displayed the ..\Mapdata\Nimadata\VPF-Shapes\NOAMER\LIB_080\TRANS\ RoadL.shape file.
Note that this shapefile is a subset of the whole Vmap1 data set since the original data was displayed as a GeoSym subset of the whole using the Blow up map Full detail option from the VPF popup menu.

Individual shapefiles may be manually sorted or deleted using the OVERLAY/OVERLAY MANAGER. The order of overlays in the Overlay Manager reflect the drawing order on your display. If one of your overlays is obscuring another simply click on that overlay and drag it to a new position in the stack. To delete a single overlay simply click on it and drag it to the trash can at the upper right corner of the manager window.



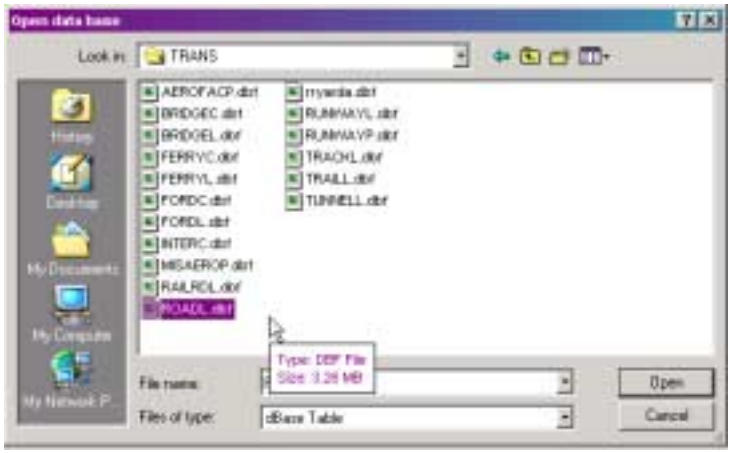
NOTE: If you only have a single overlay you will not get the pop-up Map Overlay Manager, you will simply be asked if you wish to delete the single overlay.

Filtering and Display of DataBase Attribute Files

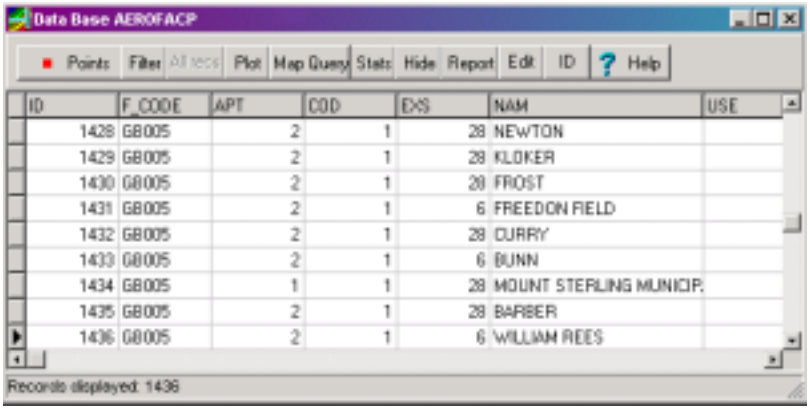
Once converted the attribute data may be filtered, searched and queried allowing the resulting records to be graphically displayed. Display selected dbase attribute files by clicking on the

<Database> button on the map display --> DB

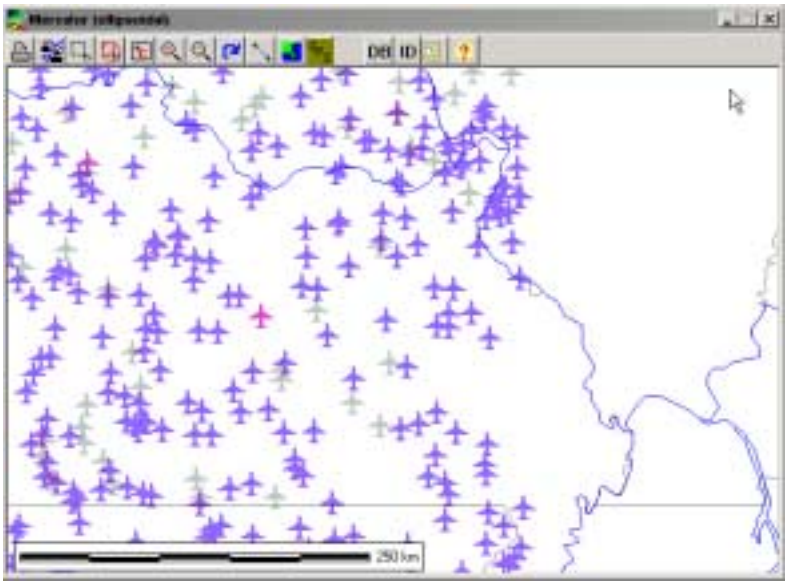
This will bring up the Open data base window.



Here you set Files of type to dBase Table, navigate to your ..\Mapdata\Nimadata\VPF-Shapes directory and the specific subdirectory for the theme you wish to load.



This is a part of the attribute table for the AEROFACP.DBF file. Note the slider bars along the bottom and right edge of the table which allow access to the remaining information. The window may also be resized by clicking and holding down the mouse button and dragging the edge or corner of the table to the desired size.

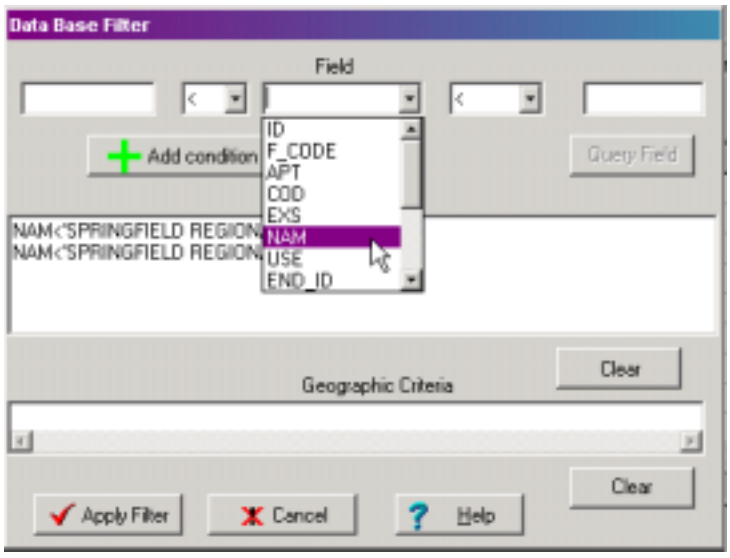


This is the AEROFACP.DBF file plotted on the world vector (.SIN) map background.
Here I've used the GeoSym symbology to represent the airfields.

Plot selected dbase files by clicking on the <Plot> button -->  on the related database table.

This will bring up the Plot menu where you select VPF GeoSym symbology if you're running a Windows NT or 2000 PC. Select Use selected symbology if you're running a Win 95/98/Millenium PC.

Filtering of records is a very useful function where Boolean Logical comparisons may be made between specific fields and their content. Click on the < Filter> button --> 

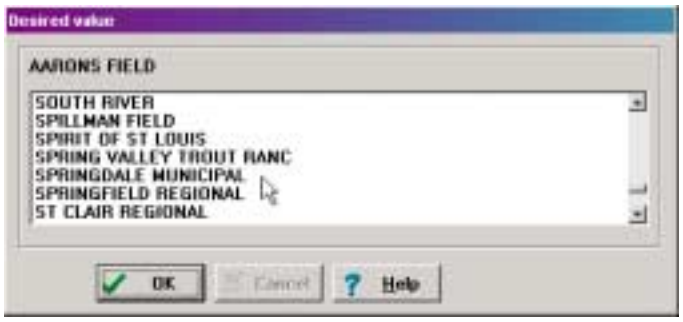


This will bring up the Data Base Filter window.

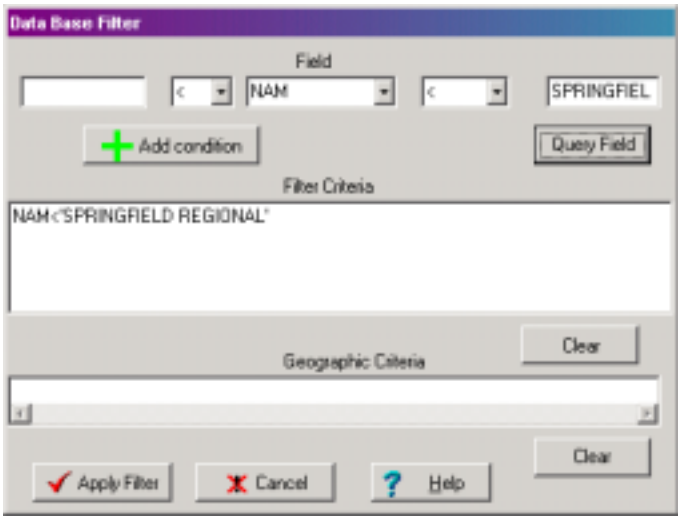
To find a feature of a specific name select the NAM Field from the list as shown above, set the right hand operator to equals 

(Be sure to select the proper Boolean logic on the correct side of the equation or your filter won't work like you want it to.)
Next click on the <Query Field> button --> 

to select the desired name from the Desired Value popup window.

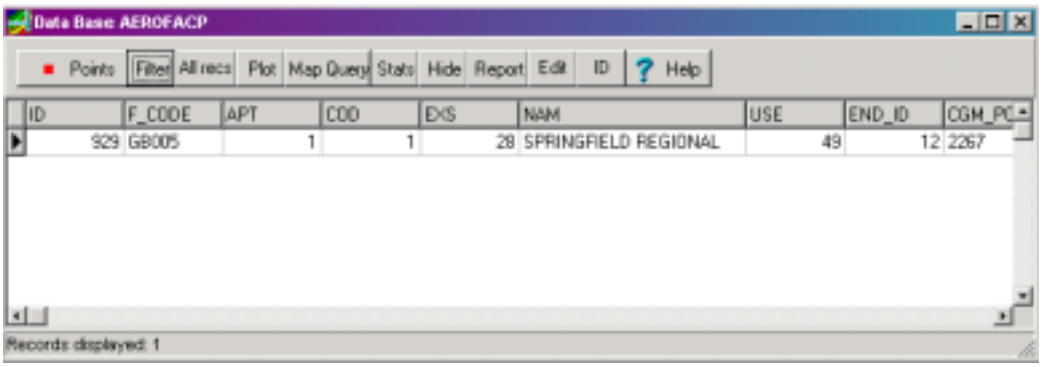


When you're satisfied with your equation click on the <Add condition> button 



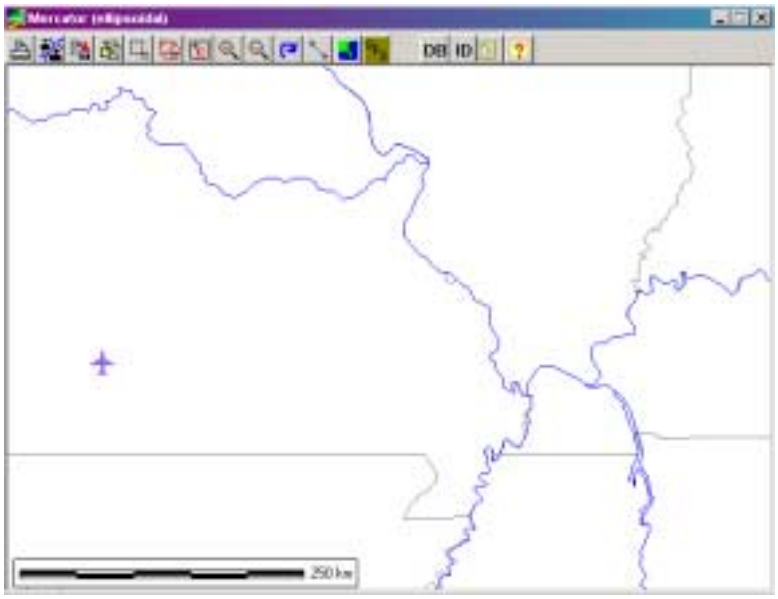
NOTE: You can apply more than a single Filter Criteria for a given search.

Finally click on the <Apply Filter> button 



The records that match your query will be displayed in the Data Base table for your feature.
Plot selected dbase files by clicking on the <Plot> button -->  on the database table.

This will bring up the Plot menu where you select VPF GeoSym symbology if you're running a Windows NT or 2000 PC. Select Use selected symbology if you're running a Win 95/98/Millenium PC.

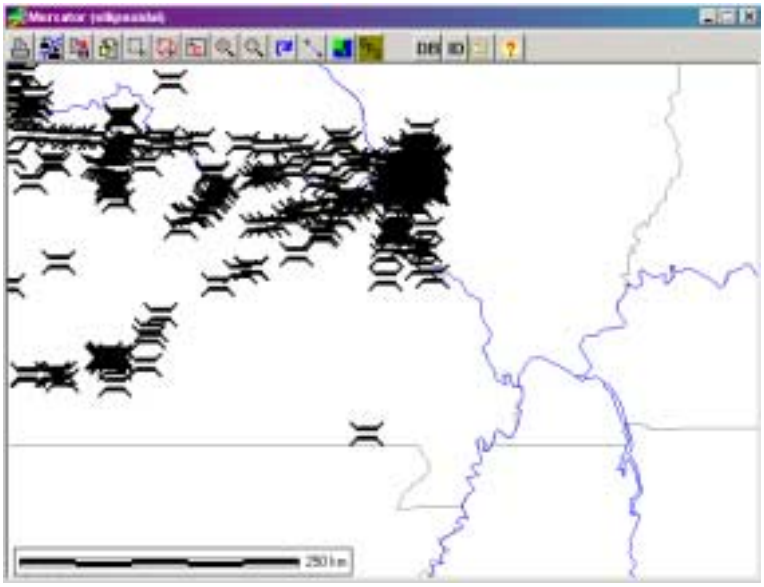


The filtered records will be displayed on your background map.

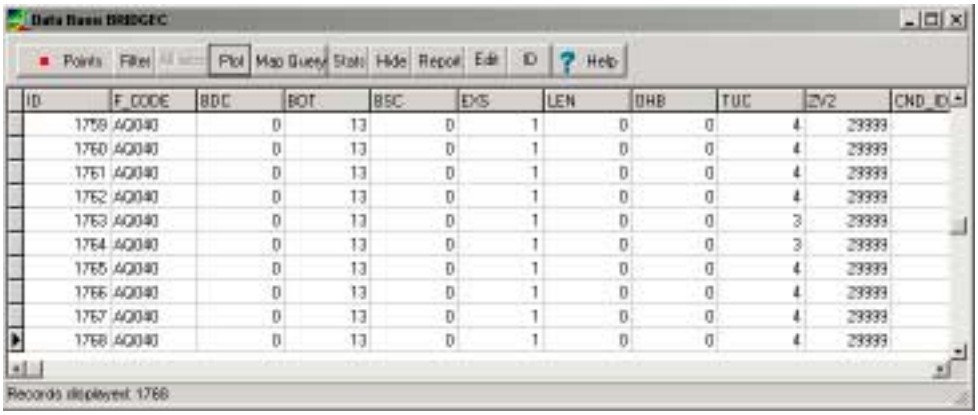
To restore all records for your feature table simply click on the <All recs> button --> 

Database feature displays may be deleted by closing the related dbase table and clicking on the <Force Redraw> button -->  on the map display.

Map Query of DataBase Attribute Displays



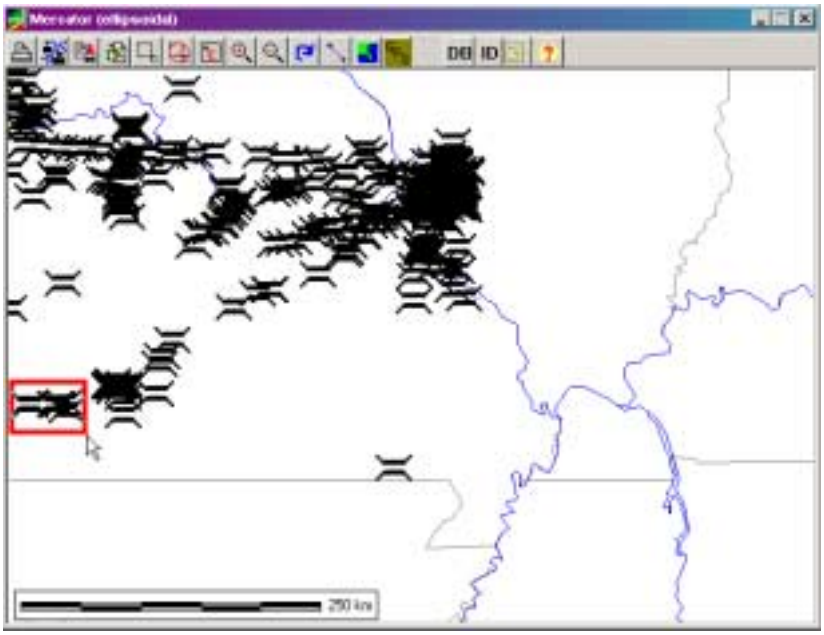
Here I have displayed the BridgeC point data from my Vmap1 data subset from its database table.



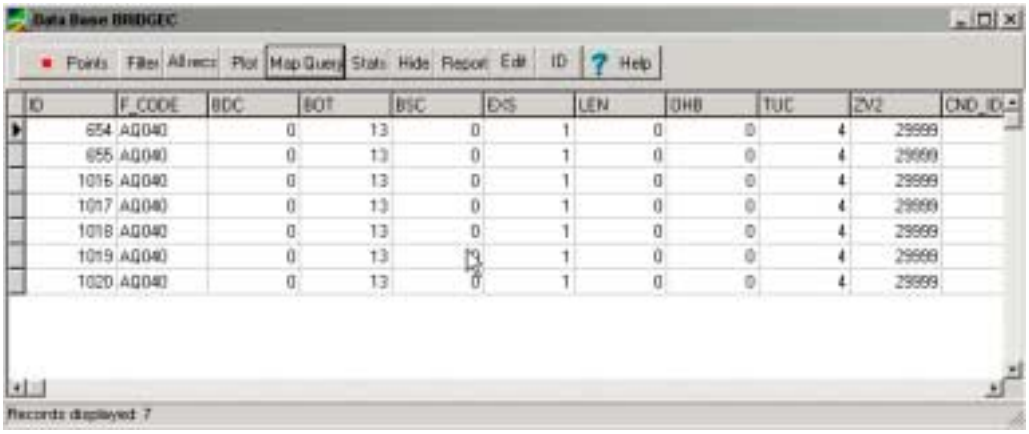
ID	F_CODE	BDC	BOT	BSC	EXS	LEN	OHB	TUC	ZV2	CND_ID
1759	AQ040	0	13	0	1	0	0	4	23333	
1760	AQ040	0	13	0	1	0	0	4	23333	
1761	AQ040	0	13	0	1	0	0	4	23333	
1762	AQ040	0	13	0	1	0	0	4	23333	
1763	AQ040	0	13	0	1	0	0	3	23333	
1764	AQ040	0	13	0	1	0	0	3	23333	
1765	AQ040	0	13	0	1	0	0	4	23333	
1766	AQ040	0	13	0	1	0	0	4	23333	
1767	AQ040	0	13	0	1	0	0	4	23333	
1768	AQ040	0	13	0	1	0	0	4	23333	

With your database attribute data displayed you may perform graphical queries by clicking on the <Map Query> button  this will bring up the Map Query popup menu.

Here you should select Select region from the menu then click on the Map display at the North West corner of your region, hold down the mouse button and drag the mouse pointer to the South East corner of the region you wish to query as shown below.



Thel records from within the region you defined will be listed in the DataBase table for that feature as shown below.



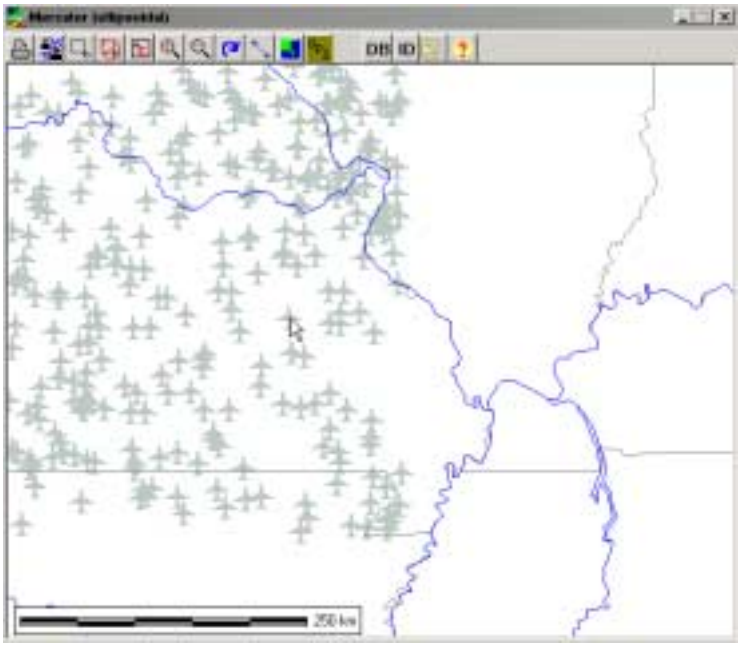
To restore all records for your feature table simply click on the <All recs> button --> 

Database feature displays may be deleted by closing the related dbase table and clicking on the <Force Redraw> button -->  on the map display.

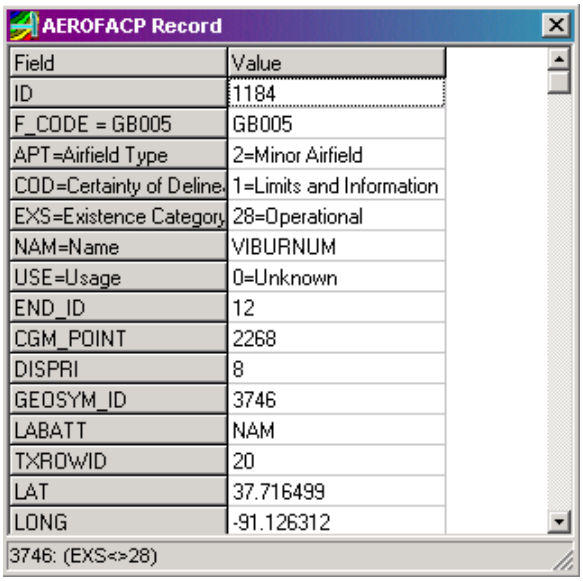
ID Query of Individual Map Features

Another method of performing a map query to bring up the attributes for a feature on your map is to utilize the <ID> button → 

After clicking on the <ID> button simply double-click on the individual feature you wish to investigate.



This will bring up the attribute data record for that specific feature.



Click on the <X> button →  to close the feature's popup record window and redisplay all records in your Data Base table.

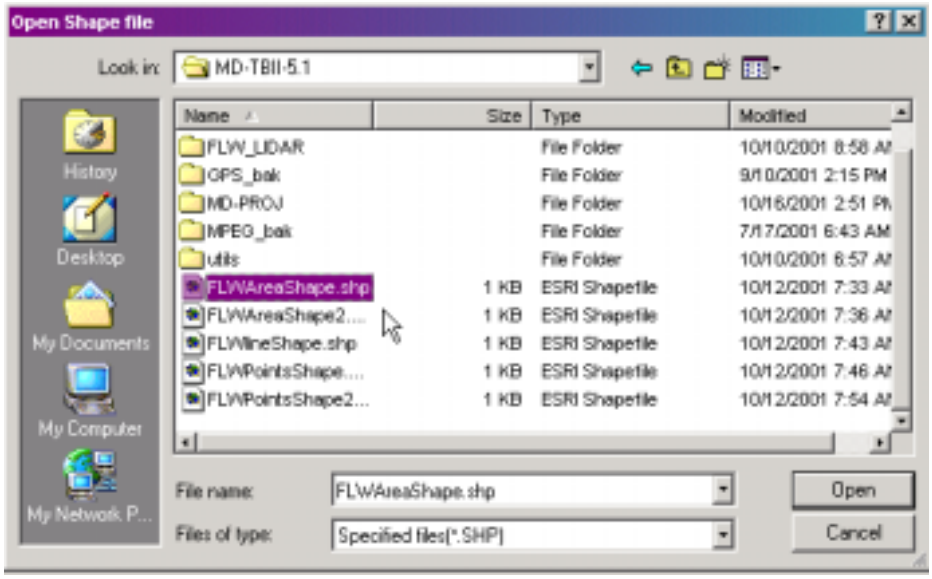
Adding Data Fields to Shape Database Files

If you need to add another field to your shape database file it's easy.

Click on the <IN-OUT> button → 

to bring up the DataManipulation for MicroDEM/TerraBase II window.

Here you select RESAMPLE/SHAPEFILE and any of the following Add functions: Add bounding box, Add line endpoints, Add lat/long field, Add length field, Add area field, Add color field, Add field from linked table and Add any field. In order to demonstration the functionality we will go through the addition of new field to one of our preexisting shape dBase files by selecting Add any fields. This will bring up the Open Shape file window.

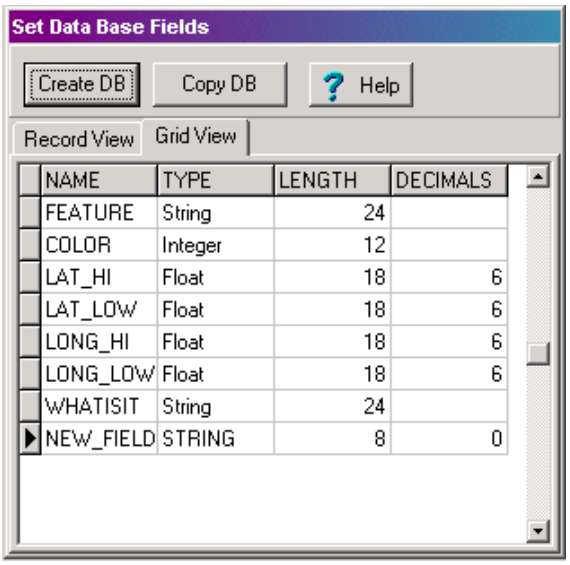


Navigate to the location of the shape file whose associated dbase table you wish to modify and select it. This will bring up the Set Data Base Fields interface.

Type the name of the new field in the Field Name data entry field. Select the type of field you wish to add by clicking on one of the Field types: String, Integer or Float. If you wish to have a field length other than the default then change the value in the Field Length data entry field.

When your are ready to add the new field click on the <+> button → 

Click on the Grid View tab to see the structure of your database table with your new field.

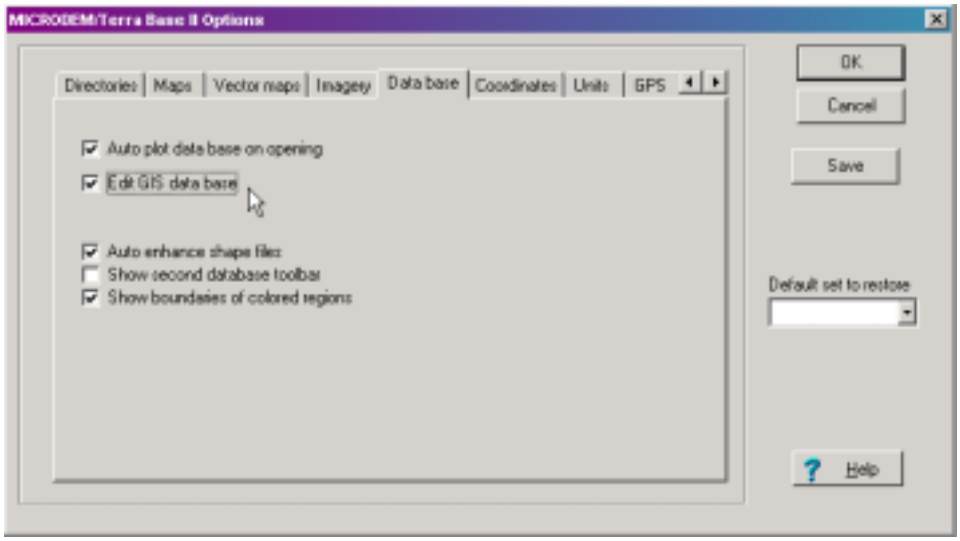


To enable the change to your current database file click on the <Copy DB> button → 

Editing Shape Database File Attributes

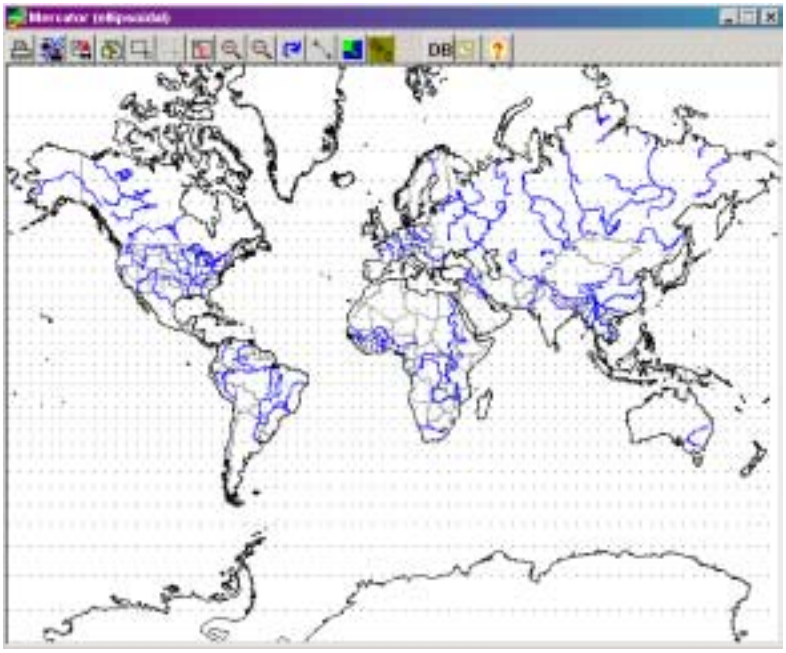
If you need to change attribute data for your shape files you may do so but be careful since this function will allow you to corrupt your data.

First you will need to go to the main menu and select OPTIONS then at the Database tab check the Edit GIS data base box.

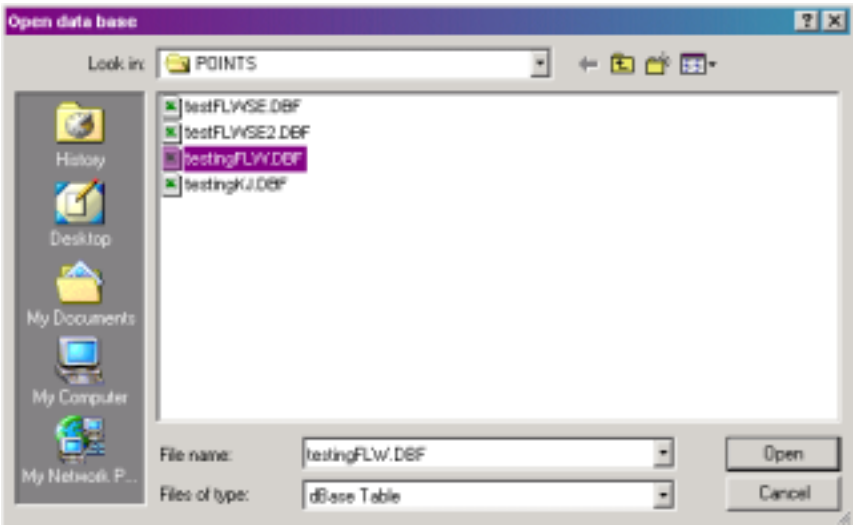


Click on the <OK> button to close the MicroDEM/TerraBase Options window.

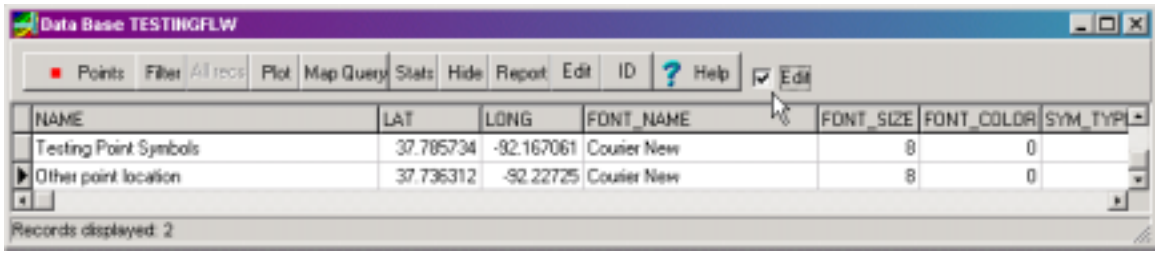
Open a background map for your AOI or simply open the World Vector .SIN map by clicking on the <Open Vector Map> button → 



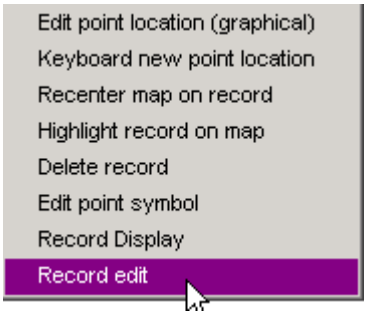
Click on the <DB> button → DB to bring up the Open data base window.



Navigate to the location and select the desired .DBF file you wish to edit by double clicking on the file name or by clicking on the <OPEN> button → Open This will bring up the Data Base table for the select file.

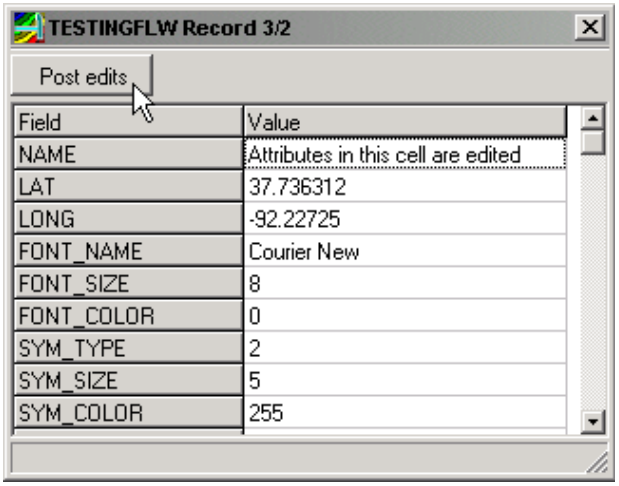


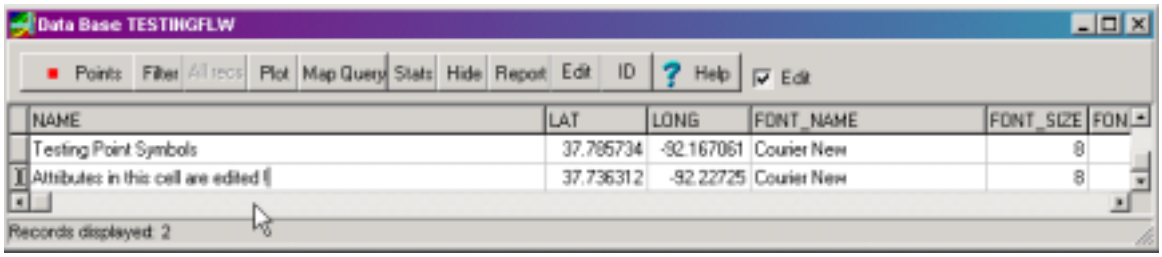
Here you must check the [] Edit box before you can actually change any of the cell contents. Then you can double click on a record to bring up the Editing menu.



Here select Record edit from the menu.

The record will appear in an edit window. After you make any desired changes, insure that you select the <Post edits> button to update the database.





As you can see the attribute data in the second record cell has been altered. Be careful when making changes to your data since you may make your data inaccurate or unusable. You should work with a copy of your data until you are confident of your ability to edit the file without corrupting it.

Displaying DTSS Digital Overlay Products

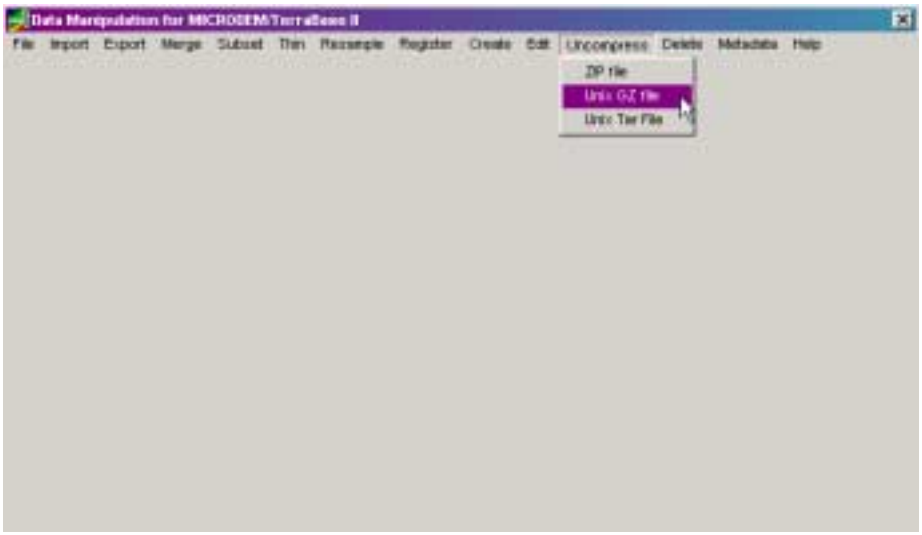
The Digital Topographic Support System (DTSS) utilized by Engineer Terrain Teams provides vector data map overlays to the various Army Battle Command Systems (ABCS) via Digital Overlay Products (DOP). Each ABCS system will be capable of viewing these overlays using the DOP Viewer.

Standalone users on non-UNIX systems may view these products in MicroDEM by using the the DTSSOP function.

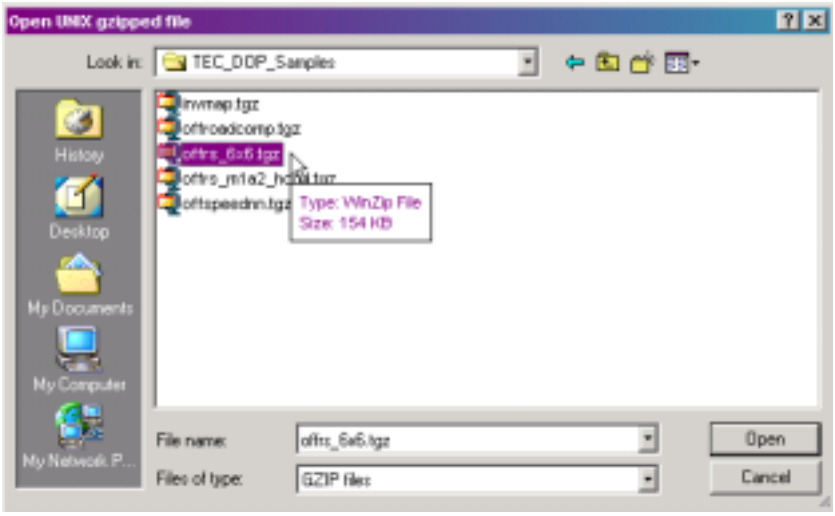
Decompressing Zip Gzip and Tar Files

DOP overlays will be compressed in a (.TGZ) gzipped tar format. These files must first be decompressed in MicroDEM by clicking on the <IN-OUT> button → 

This will bring up the Data Manipulation for MicroDEM/TerraBase II window.



First select UNCOMPRESS then UNIX GZ File. This will bring up the Open UNIX gzipped file window.



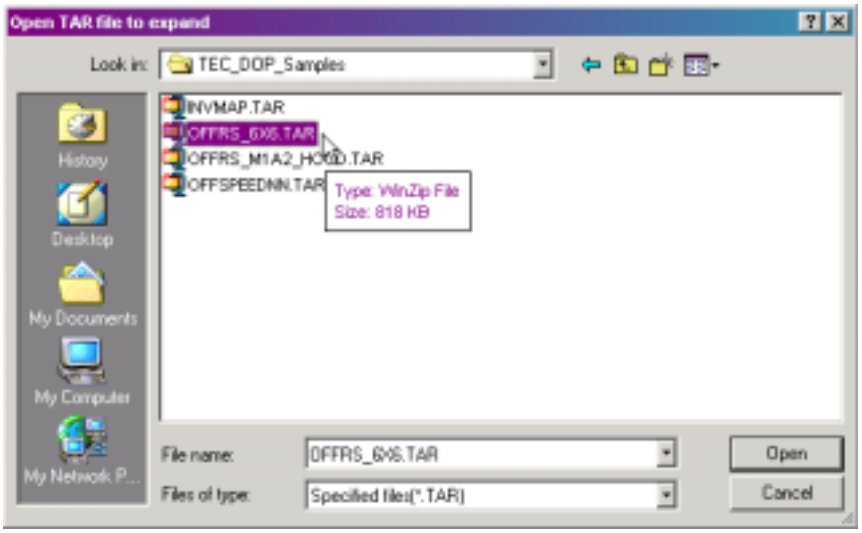
Select the desired (.TGZ) file to gunzip and click on the <OPEN> button → 

When the file has been un-gzipped a message will appear in the Data Manipulation window stating that the file is done and the Open UNIX gzipped file window will reappear.

```
expanding UNIX GZIP file: H:\TEC_DOP_SAMPLES\OFFRS_6X6.TGZ
  done; original file unchanged
```

Close the Open UNIX gzipped file window by clicking on the <X> button →  or by clicking on the the <CANCEL> button.

In the Data Manipulation window select UNCOMPRESS and then UNIX TAR File. This will bring up the Open TAR file to expand window.



Select the desired (.TAR) file to untar and click on the <OPEN> button →

When the file has been untarred a message will appear in the Data Manipulation window showing the path to the completed .tar file.

```
EXTAR: H:\TEC_DOP_SAMPLES\OFFRS_6X6.TAR
```

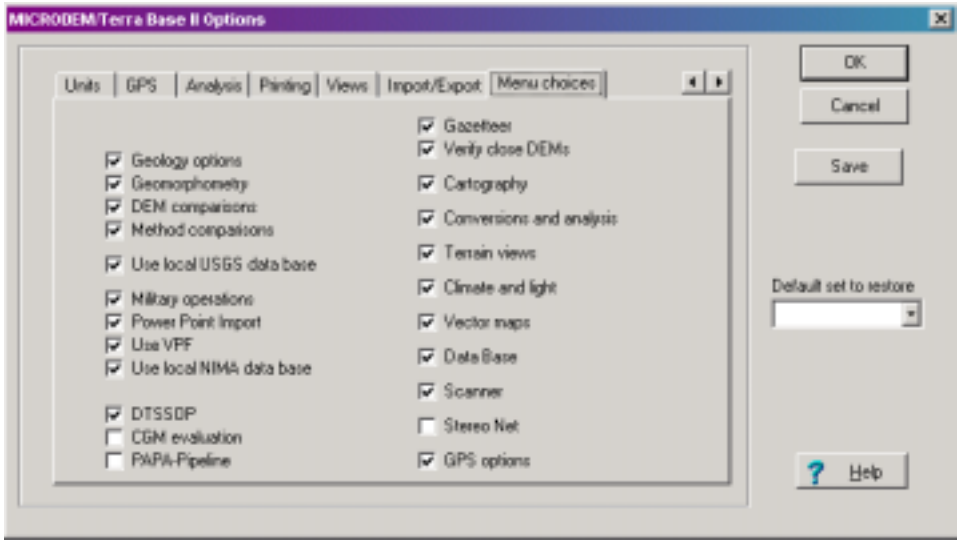
NOTE: Untarring files take time. If you have more than one .TAR file to process you may highlight the desired files using the <CTRL> button on your keyboard and your mouse. Once you've selected the desired .TAR files click on the <OPEN> button and the files will be processed **in-batch**. This procedure is useful when you wish to untar a large number of files or a series of large files and you must be away from your computer.

The decompressed DOP files now have .dtss extensions and may be displayed in MicroDEM via three different methods.

- Start the program with a **–DTSS** command line parameter.
- Use the <DTSS> button on the main GUI toolbar.
- Use the OVERLAY/VECTOR OUTLINES function to display the DOP as an overlay.

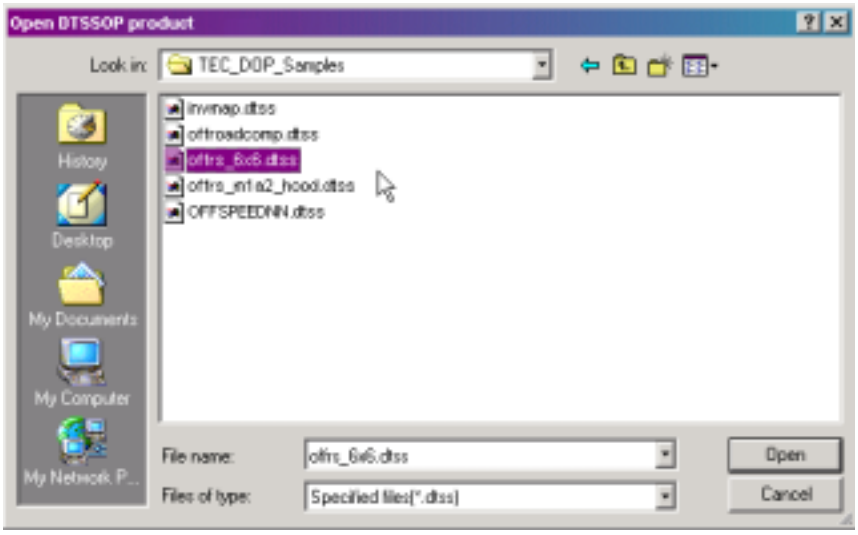
Display DOP Using the <DTSS> Button on the Main GUI Toolbar

To enable the <DTSS> button go to the main menu and select OPTIONS then at the Menu Choices tab check the DTSSOP box [].



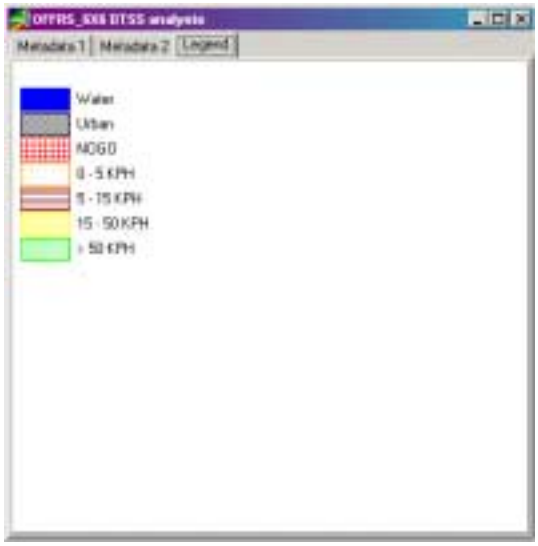
To display your Digital Overlay Product in a new window click the <DTSS> button → 

This will bring up the Open DTSSOP product window.

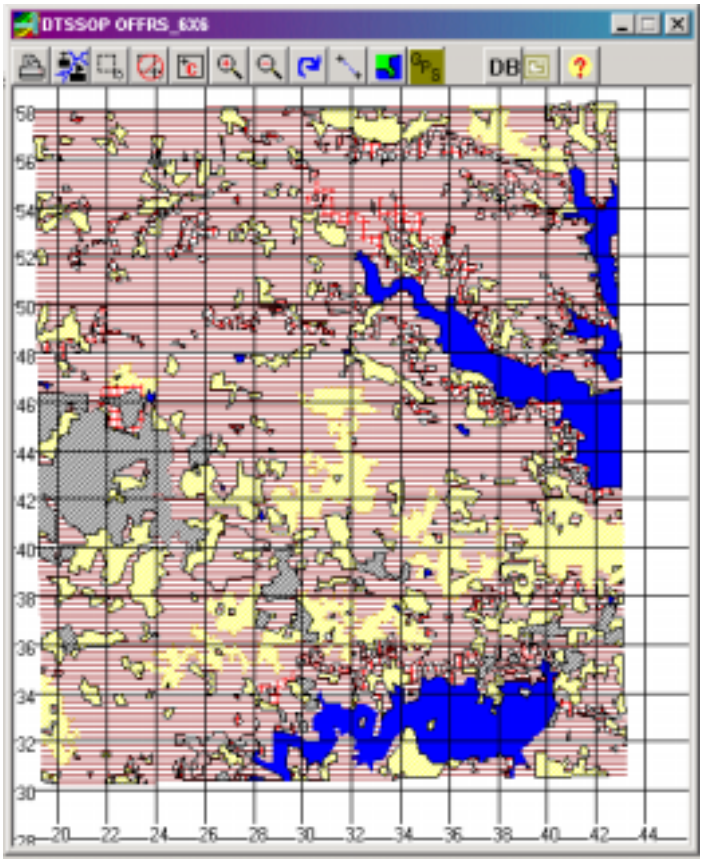


Select the desired (.DTSS) file and click on the <OPEN> button → 

The Metadata and Legend for your DOP will be displayed in one window with each being selectable by its own tab.



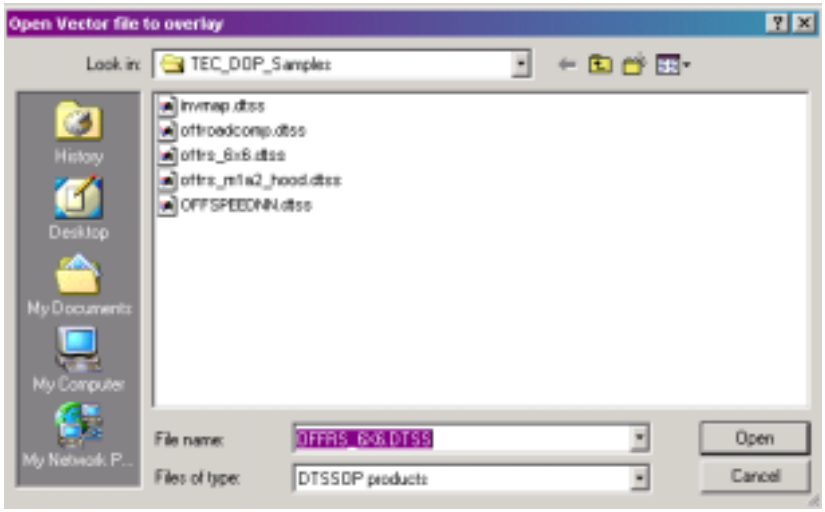
The DOP will be displayed in a separate window as shown below.



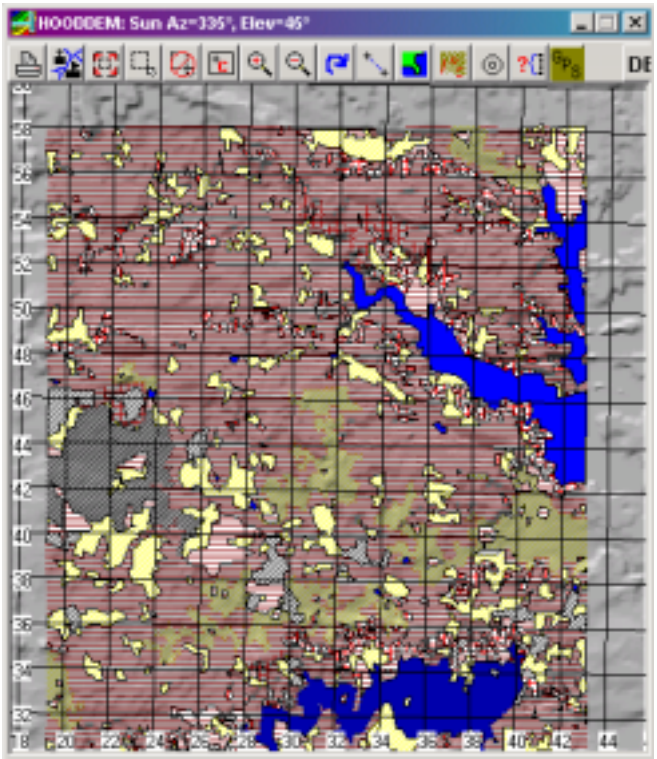
The DOP display showing Off Road Speed Analysis. See the Legend on the previous page.

Display the DOP as an Overlay

Digital Overlay Products may be displayed over elevation, imagery or map backgrounds.
After you have loaded your background display data you may overlay your DOP by selecting the OVERLAY and VECTOR OUTLINES function at the main menu. This will bring up the Open Vector file to overlay window.



Here you will need to set your Files of type to DTSSOP products then navigate to and select the desired DOP overlay.



Here we have displayed our elevation data for our AOI with the DOP overlay.

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